TRANE

Maintenance

⚠AVERTISSEMENT

Pressions dangereuses!

Tout manquement aux consignes de sécurité préconisées ci-dessous risquerait d'entraîner un éclatement du serpentin susceptible de provoquer des blessures graves voire mortelles. Les serpentins contiennent du fluide frigorigène sous pression. Lors du nettoyage des serpentins, maintenez la température de l'agent de nettoyage pour serpentin à moins de 65,5 °C (150 °F) pour éviter toute pression excessive dans le serpentin.

4. Mix the detergent with water according to the manufacturer's instructions. If desired, heat the solution BUT DO NOT EXCEED 150°F maximum to improve its cleansing capability.
5. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
   a. do not allow sprayer pressure to exceed 600 psi.
   b. the minimum nozzle spray angle is 15°.
   c. maintain a minimum clearance of 6 in. between the sprayer nozzle and the coil.
   d. spray the solution perpendicular (at 90°) to the coil face.
6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. Allow the cleaning solution to stand on the coil for five minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Step 6 and Step 7.
9. Reinstall all of the components and panels removed in Step 1 and any protective covers installed in Step 2.

Final Process

For future reference, you may find it helpful to record the unit data requested below in the blanks provided.

(1) Complete Unit Model Number:

____

____

____

(2) Unit Serial Number:

____

____

____

(3) Wiring Diagram Numbers (from unit control panel)

— schematic(s)

____

____

____

____

____

— connection(s)

____

____

____

Table 9. Sample maintenance log

		Refrigerant Circuit #1						Refrigerant Circuit #2					
Date	Current Ambient Temp F/C	Compr. Oil Level	Suct. Press. Psig/kPa	Disch. Press Psig/kPa	Liquid Press Psig/kPa	Super-heat F/C	Sub-cool F/C	Compr. Oil Level	Suct. Press. Psig/kPa	Disch. Press Psig/kPa	Liquid Press Psig/kPa	Super-heat F/C	Sub-cool F/C
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					

TRANE

General Data

Table 10. General data—Cooling 10–20 tons high efficiency

	10 Tons Downflow	12 Tons Downflow	15 Tons Downflow	17 Tons Downflow	20 Tons Downflow
	OADG010	**OADG012**	**OADG015**	**OADG017**	**OADG020**
Cooling Performance (6-row)					
Gross Cooling Capacity, Btu (kW)	134,530 (39.43)	153,380 (44.95)	192,718 (56.48)	215,551 (63.17)	248,068 (72.70)
Nominal cfm (m^3/h)	1,500 (2,549)	1,800 (3,058)	2,250 (3,823)	2,550 (4,332)	3,000 (5,097)
Cooling Performance (4-row)					
Gross Cooling Capacity, Btu (kW)	135,303 (39.65)	151,147 (44.30)	186,972 (54.80)	213,659 (62.62)	242,918 (71.19)
Nominal cfm (m^3/h)	4,000 (6,796)	4,800 (8,155)	6,000 (10,194)	6,800 (11,553)	8,000 (13,592)
Compressor					
Number	2	2	2	2	2
Type	Scroll	Scroll	Scroll	Scroll	Scroll
Outdoor Coil					
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	30 (2.79)	30 (2.79)	30 (2.79)	30 (2.79)	30 (2.79)
Rows	2	2	2	2	2
FPI	14	14	14	14	14
Indoor Coil					
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size (6-row)—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	1/2 (12.7)	1/2 (12.7)
Tube Size (4-row)—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	10 (0.93)	10 (0.93)	10 (0.93)	17 (1.58)	17 (1.58)
Rows	6 or 4	6 or 4	6 or 4	6 or 4	6 or 4
FPI	14 or 15	14 or 15	14 or 15	14 or 15	14 or 15
Refrigerant Control	TXV	TXV	TXV	TXV	TXV
Drain Connection Number	1	1	1	1	1
Drain Connection Size, in. (mm)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)
Outdoor Fan					
Type	Propeller	Propeller	Propeller	Propeller	Propeller
Number Used	2	2	2	3	3
Diameter, in. (mm)	27 (685.8)	27 (685.8)	27 (685.8)	27 (685.8)	27 (685.8)
Drive Type	Direct	Direct	Direct	Direct	Direct
No. Speeds	1	1	1	1	1
Fan cfm (m^3/h)	7,000 (11,893)	7,000 (11,893)	7,000 (11,893)	7,000 (11,893)	7,000 (11,893)
Number Motors	2	2	2	2	2
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1,140	1,140	1,140	1,140	1,140
Indoor Fan					
Type	Airfoil	Airfoil	Airfoil	Airfoil	Airfoil
Number Used	1	1	1	1	1
Diameter	Varies	Varies	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1	1	1
Motor HP (kW)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)
Motor RPM	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500
Motor Frame Size	Varies	Varies	Varies	Varies	Varies
Filters					
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60

Table 11. General data—ASHP 10–20 tons high efficiency

	10 Tons Downflow	12 Tons Downflow	15 Tons Downflow	17 Tons Downflow	20 Tons Downflow
	OADG010	OADG012	OADG015	OADG017	OADG020
Performance					
Gross Cooling Capacity, Btu (kW)	131,284 (38.48)	149,705 (43.87)	187,181 (54.86)	217,530 (63.75)	250,834 (73.51)
Gross Heating Capacity, Btu (kW)	85,752 (25.13)	98,970 (29.01)	119,043 (34.89)	145,594 (42.67)	153,122 (44.88)
Nominal cfm (m^3/h)	1,500 (2,549)	1,800 (3,058)	2,250 (3,823)	2,550 (4,332)	3,000 (5,097)
Compressor					
Number	2	2	2	2	2
Type	Scroll	Scroll	Scroll	Scroll	Scroll
Outdoor Coil					
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	30 (2.79)	30 (2.79)	30 (2.79)	29 (2.69)	29 (2.69)
Rows	2	2	2	3	3
FPI	14	14	14	12	12
Indoor Coil					
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	10 (0.93)	10 (0.93)	10 (0.93)	17 (1.58)	17 (1.58)
Rows	6	6	6	6	6
FPI	14	14	14	14	14
Refrigerant Control	TXV	TXV	TXV	TXV	TXV
Drain Connection Number	1	1	1	1	1
Drain Connection Size, in. (mm)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)
Outdoor Fan					
Type	Propeller	Propeller	Propeller	Propeller	Propeller
Number Used	2	2	2	3	3
Diameter, in. (mm)	27 (685.8)	27 (685.8)	27 (685.8)	27 (685.8)	27 (685.8)
Drive Type	Direct	Direct	Direct	Direct	Direct
No. Speeds	1	1	1	1	1
Fan cfm (m^3/h)	7,000 (11,893)	7,000 (11,893)	7,000 (11,893)	7,000 (11,893)	7,000 (11,893)
Number Motors	2	2	2	3	3
Motor HP (kW), per motor	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)	1.0 (0.75)
Motor RPM	1,140	1,140	1,140	1,140	1,140
Indoor Fan					
Type	Airfoil	Airfoil	Airfoil	Airfoil	Airfoil
Number Used	1	1	1	1	1
Diameter	Varies	Varies	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1	1	1
Motor HP (kW)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)	1–7.5 (0.75–5.59)
Motor RPM	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500
Motor Frame Size	Varies	Varies	Varies	Varies	Varies
Filters					
Type Furnished Number Size Recommended	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60

TRANE

General Data

Table 12. General data—Cooling 40–80 tons high efficiency

	40 Tons Downflow	45 Tons Downflow	50 Tons Downflow	55 Tons Downflow	60 Tons Downflow	70 Tons Downflow	80 Tons Downflow
	OANG040	OANG045	OANG050	OANG055	OANG060	OANG070	OANG080
Cooling Performance (6-row)							
Gross Cooling Capacity, Btu (kW)	511,968 (150.04)	569,546 (166.92)	604,728 (177.23)	686,668 (201.24)	752,012 (220.39)	871,572 (255.43)	998,910 (292.75)
Nominal cfm (m^3/h)	7,500 (12,743)	6,750 (11,468)	7,500 (12,743)	8,250 (14,017)	9,000 (15,291)	10,500 (17,840)	12,000 (20,388)
Cooling Performance (4-row)							
Gross Cooling Capacity, Btu (kW)	488,728 (143.23)	553,912 (162.34)	605,568 (177.47)	642,968 (188.44)	701,308 (205.53)	847,228 (248.30)	924,696 (271.00)
Nominal cfm (m^3/h)	12,800 (21,747)	14,400 (24,466)	16,000 (27,184)	17,600 (29,903)	19,200 (32,621)	22,400 (38,058)	25,000 (42,475)
Compressor							
Number	4	4	4	4	4	4	4-6
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Outdoor Coil							
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	30 (2.79)	30 (2.79)	30 (2.79)	48 (4.46)	48 (4.46)	48 (4.46)	48 (4.46)
Rows	3	3	3	3	3	3	3
FPI	14	14	14	14	14	14	14
Indoor Coil							
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size (6-row)—OD, in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
Tube Size (4-row)—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area (6-row), ft^2 (m^2)	26 (2.42)	26 (2.42)	26 (2.42)	34 (3.16)	34 (3.16)	34 (3.16)	34 (3.16)
Face Area (4-row), ft^2 (m^2)	34 (3.16)	34 (3.16)	34 (3.16)	2x21 (3.90)	2x21 (3.90)	2x21 (3.90)	2x21 (3.90)
Rows	6 or 4	6 or 4	6 or 4	6 or 4	6 or 4	6 or 4	6 or 4
FPI	14	14	14	14	14	14	14
Refrigerant Control	TXV	TXV	TXV	TXV	TXV	TXV	TXV
Drain Connection Number	1	1	1	1	1	1	1
Drain Connection Size, in. (mm)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)
Outdoor Fan							
Type	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
Number Used	4	4	4	6	6	6	6
Diameter, in. (mm)	30 (762)	30 (762)	30 (762)	30 (762)	30 (762)	30 (762)	30 (762)
Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct
No. Speeds	1	1	1	1	1	1	1
Fan cfm (m^3/h)	40,000 (67,960)	40,000 (67,960)	40,000 (67,960)	60,000 (101,941)	60,000 (101,941)	60,000 (101,941)	60,000 (101,941)
Number Motors	4	4	4	6	6	6	6
Motor HP (kW), per motor	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)
Motor RPM	1,140	1,140	1,140	1,140	1,140	1,140	1,140
Indoor Fan							
Type	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1	1	1	1	1
Diameter, in. (mm)	Varies	Varies	Varies	Varies	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1	1	1	1	1
Motor HP (kW) (Standard/ Oversized)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)

Table 12. General data—Cooling 40–80 tons high efficiency (continued)

	40 Tons Downflow	45 Tons Downflow	50 Tons Downflow	55 Tons Downflow	60 Tons Downflow	70 Tons Downflow	80 Tons Downflow
	OANG040	OANG045	OANG050	OANG055	OANG060	OANG070	OANG080
Motor RPM (Standard/ Oversized)	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500
Motor Frame Size (Standard/Oversized)	Varies	Varies	Varies	Varies	Varies	Varies	Varies
Filters							
Type Furnished	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60
Number Size Recommended							

Table 13. General data—ASHP 40–80 tons high efficiency

	40 Tons Downflow	45 Tons Downflow	50 Tons Downflow	55 Tons Downflow	60 Tons Downflow	70 Tons Downflow	80 Tons Downflow
	OANG040	OANG045	OANG050	OANG055	OANG060	OANG070	OANG080
Cooling Performance							
Gross Cooling Capacity, Btu (kW)	495,304 (145.16)	558,120 (163.57)	577,584 (169.27)	670,550 (196.52)	719,942 (210.99)	842,536 (246.92)	928,964 (272.25)
Gross Heating Capacity, Btu (kW)	460,464 (134.95)	522,116 (153.02)	568,292 (166.55)	632,996 (185.51)	648,720 (190.12)	774,200 (226.90)	876,054 (256.75)
Nominal cfm (m^3/h)	5,000–10,000 (8,495–16,990)	5,625–11,250 (9,557–19,114)	6,250–12,500 (10,619–21,238)	6,875–13,750 (11,681–23,361)	7,500–15,000 (12,743–25,485)	8,750–17,500 (14,866–29,733)	10,000–20,000 (16,990–33,980)
Compressor							
Number	4	4	4	4	4	4	5
Type	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Outdoor Coil							
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size—OD, in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Face Area, ft^2 (m^2)	45 (2.79)	45 (2.79)	45 (2.79)	45 (2.69)	45 (2.69)	45 (2.69)	45 (2.69)
Rows	2	2	2	2	2	3	3
FPI	14	14	14	14	14	14	14
Indoor Coil							
Type	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance	High-Performance
Tube Size—OD, in. (mm)	1/2 (9.5)	1/2 (9.5)	1/2 (9.5)	1/2 (9.5)	1/2 (9.5)	1/2 (9.5)	1/2 (9.5)
Face Area, ft^2 (m^2)	26 (0.93)	26 (0.93)	26 (0.93)	26 (1.58)	34 (1.58)	34 (1.58)	34 (1.58)
Rows	6	6	6	6	6	6	6
FPI	14	14	14	14	14	14	14
Refrigerant Control	TXV	TXV	TXV	TXV	TXV	TXV	TXV
Drain Connection Number	1	1	1	1	1	1	1
Drain Connection Size, in. (mm)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)	1 (25.4)
Outdoor Fan							
Type	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
Number Used	4	4	4	6	6	6	6
Diameter, in. (mm)	30 (685.8)	30 (685.8)	30 (685.8)	30 (685.8)	30 (685.8)	30 (685.8)	30 (685.8)
Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct
No. Speeds	1	1	1	1	1	1	1
Fan cfm (m^3/h)	40,000 (67,960)	40,000 (67,960)	40,000 (67,960)	60,000 (101,941)	60,000 (101,941)	60,000 (101,941)	60,000 (101,941)
Number Motors	6	6	6	6	6	6	6
Motor HP (kW), per motor	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)	1.5 (1.12)
Motor RPM	1,140	1,140	1,140	1,140	1,140	1,140	1,140
Indoor Fan							
Type	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined	Backward Inclined
Number Used	1	1	1	1	1	1	1

TRANE

General Data

Table 13. General data—ASHP 40–80 tons high efficiency

	40 Tons Downflow	45 Tons Downflow	50 Tons Downflow	55 Tons Downflow	60 Tons Downflow	70 Tons Downflow	80 Tons Downflow
	OANG040	OANG045	OANG050	OANG055	OANG060	OANG070	OANG080
Diameter, in. (mm)	Varies	Varies	Varies	Varies	Varies	Varies	Varies
Drive Type	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive	Direct Drive
Number Motors	1	1	1	1	1	1	1
Motor HP (kW) (Standard/ Oversized)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)	1.5–20 (1.12–14.91)
Motor RPM (Standard/ Oversized)	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500	1750–3500
Motor Frame Size (Standard/Oversized)	Varies	Varies	Varies	Varies	Varies	Varies	Varies
Filters							
Type Furnished	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60	Refer to "OAU Filter Guide" in "Appendix," p. 60
Number Size Recommended							

Superheat and Refrigeration Circuit Data

Figure 42. Refrigeration diagram: Tandem compressor without reheat

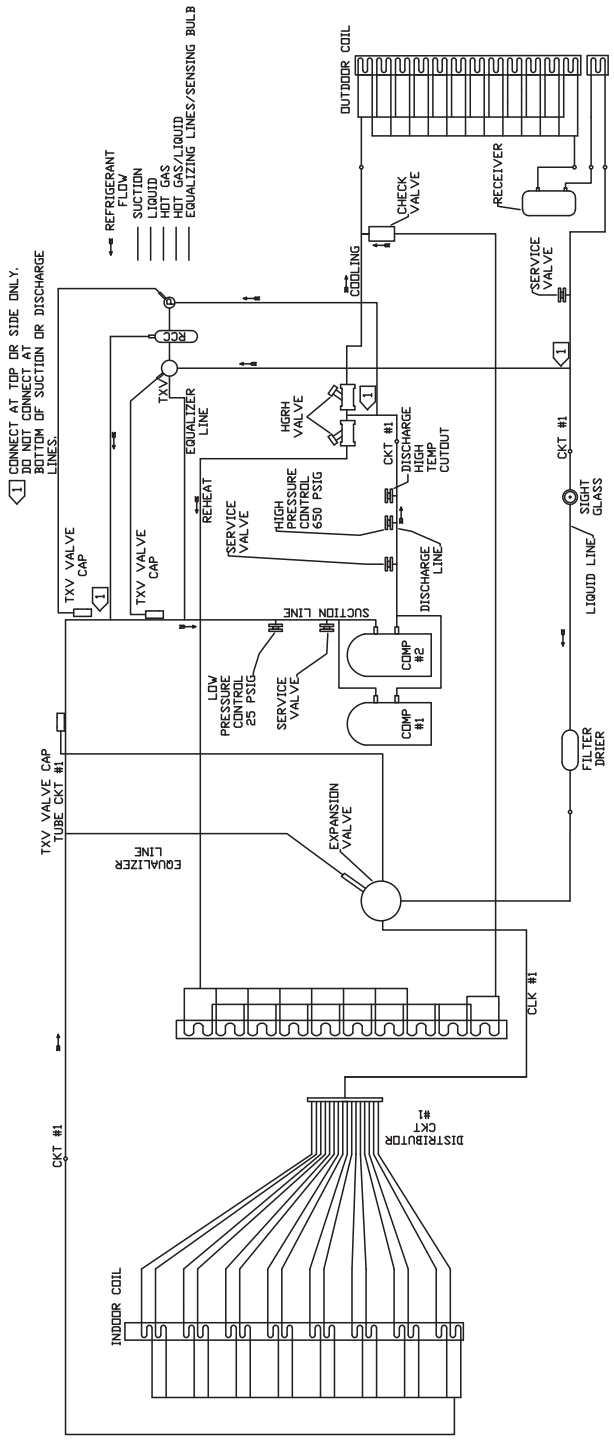
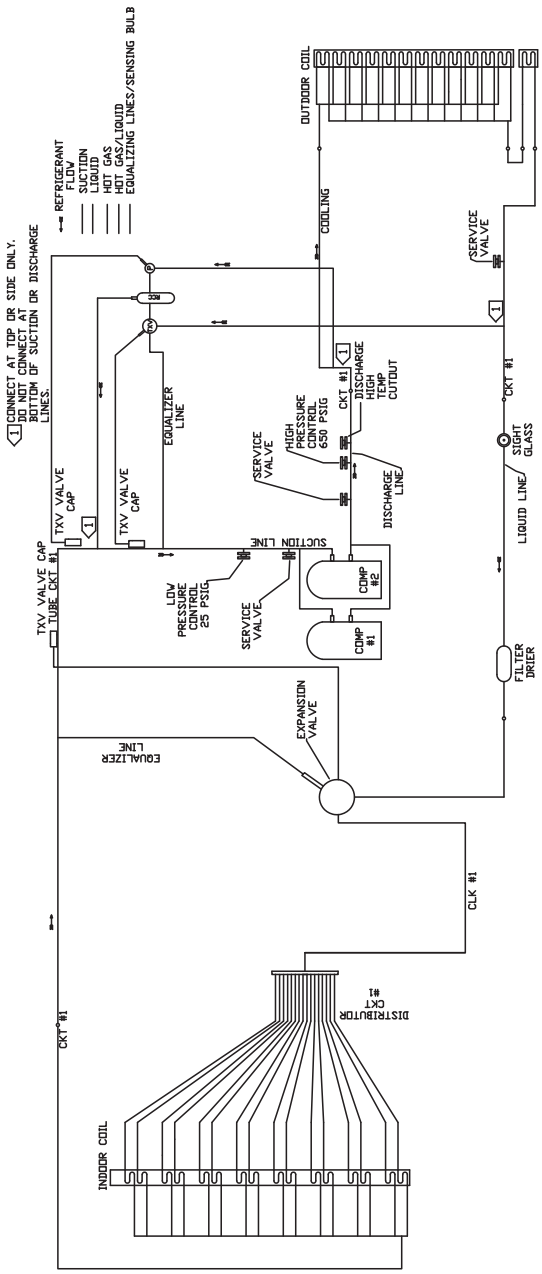


Figure 43. Refrigeration diagram: Tandem compressor with reheat



TRANE

General Data

Figure 44. Refrigeration diagram: ASHP Tandem compressor without reheat

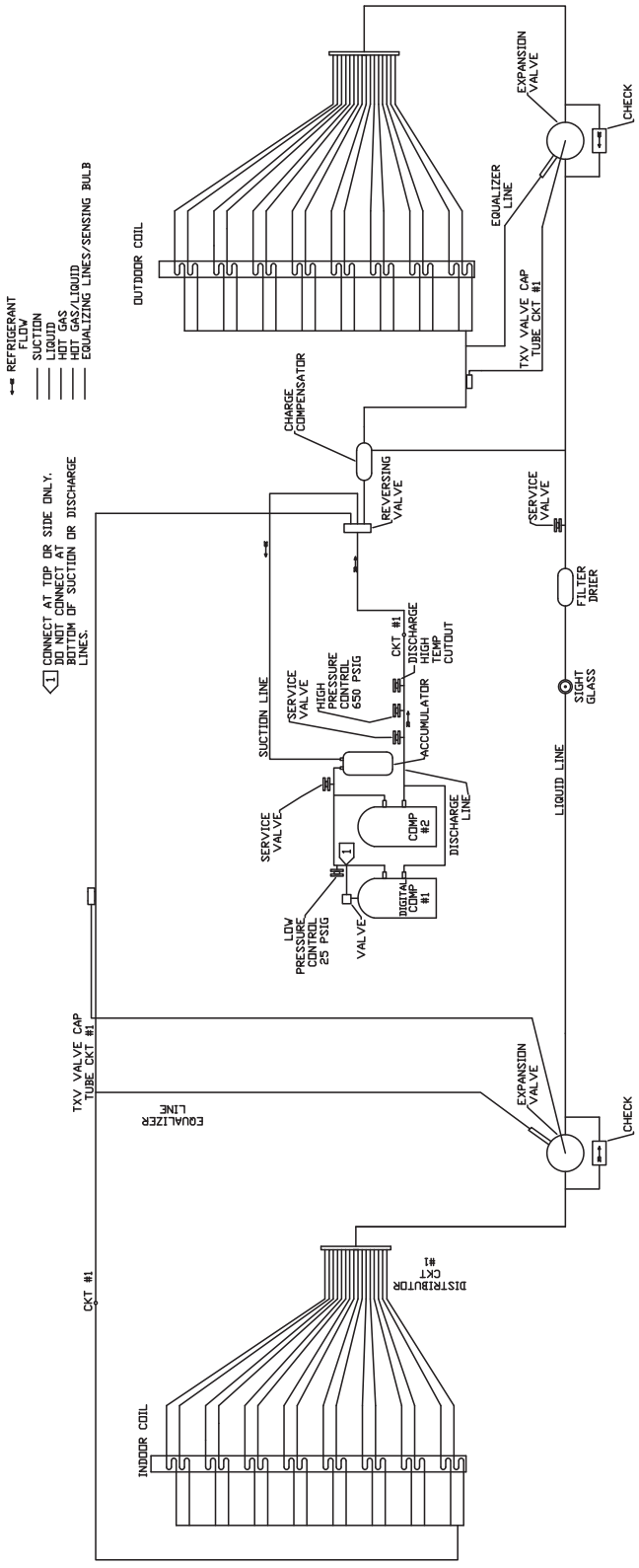
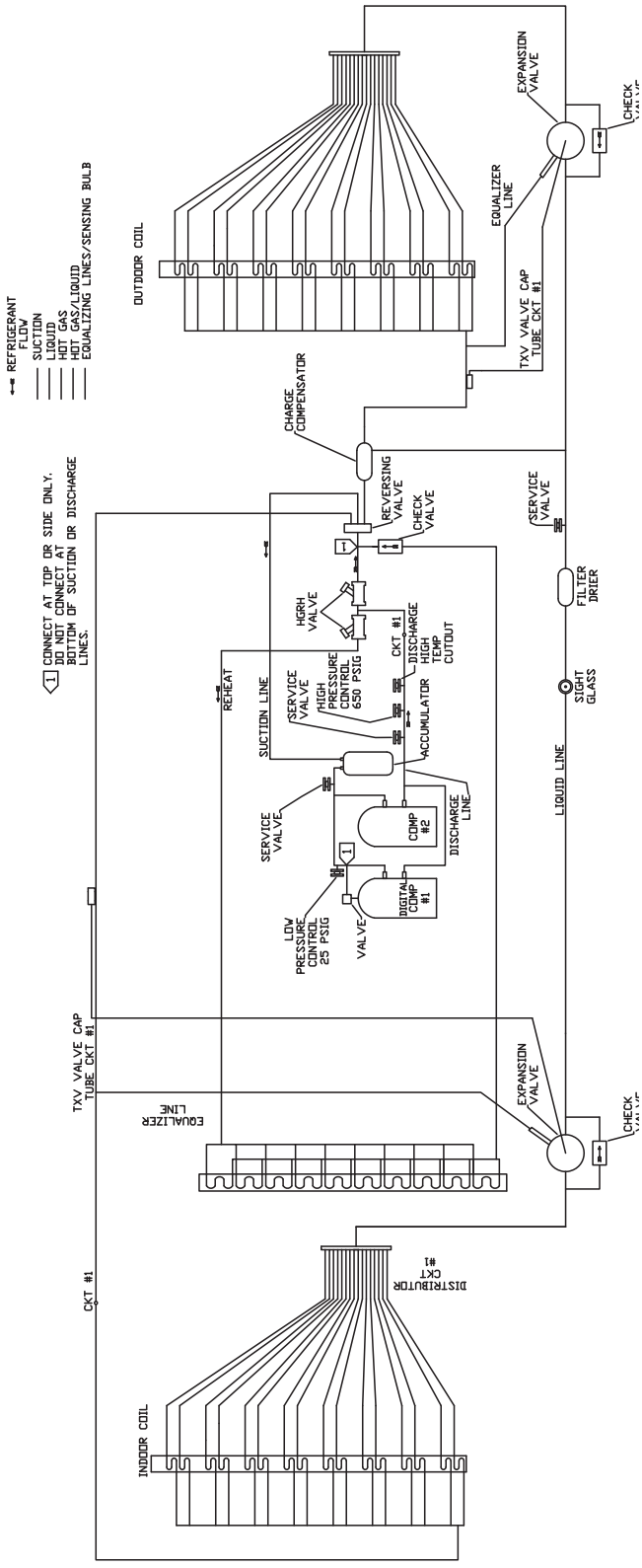


Figure 45. Refrigeration diagram: ASHP Tandem compressor with reheat



Alarms and Troubleshooting

Microprocessor Control

The Main Unit Display and RTRM have the ability to provide the service personnel with some unit diagnostics and system status information.

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.
Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Procédures d'entretien dangereuses!

Le non-respect de toutes les précautions contenues dans ce manuel ainsi que sur les étiquettes et les autocollants peut entraîner des blessures graves voire mortelles.
Les techniciens, afin d'être protégés des éventuels risques électriques, mécaniques et chimiques, DOIVENT suivre les précautions contenues dans ce manuel, sur les étiquettes et les autocollants, ainsi que les instructions suivantes : Sauf indication contraire, coupez toute l'alimentation électrique y compris les disjoncteurs à distance et déchargez tous les dispositifs de stockage d'énergie comme les condensateurs avant l'entretien. Respectez les procédures de verrouillage et d'étiquetage appropriées pour éviter tout risque de remise sous tension accidentelle. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

1. Verify that the Liteport LED on the RTRM is burning continuously. If the LED is lit, go to Step 3.
2. If the LED is not lit, verify that 24 Vac is presence between J1-1 and J1-2. If 24 Vac is present, proceed to Step 3. If 24 Vac is not present, check the unit main power supply, check transformer (TNS1). Proceed to Step 3 if necessary.
3. Utilizing "Method 1" in the RTRM "System Status Checkout Procedure", check the following:
   - System status
   - Cooling status

   If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to Step 5.
4. If a System failure is indicated, recheck Step 1 and Step 2. If the LED is not lit in Step 1, and 24 Vac is present in Step 2, the RTRM has failed. Replace the RTRM.
5. If no failures are indicated, use one of the override options to start the unit. Following the Override procedure will allow you to check all of the operating modes, and all of the external controls (relays, contactors, etc.) for each respective mode.
6. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Step 7.
7. If no abnormal operating conditions appear in the Override mode, release the override and turn the power "Off" at the main power disconnect switch.

System Alarms

The Main Unit Display has built in alarms to help the operator troubleshoot system failures. This section will describe these alarms and provide a guide to troubleshooting the all unit operating modes.

Comprehensive system alarms and diagnostics are accessed through the Alarms icon at the unit display discussed later in the section, or through Tracer TU programming on connected computer. Sensor failures may be viewed through the Alarms icon.

If an alarm is present, the main indicator light on the UC600 will blink red. If the optional unit display is installed, the Alarm icon on the display will register ALARM, illuminate red and flash.

Important: *The space temperature sensor (SPTC) and space relative humidity sensor (SPHC) will read failed if they are not connected; they will Alarm as "In Fault."*

Sensor Failure Alarm Display

Press the Alarm button on the Home display of the Unit Display to display system sensor status as described in Table 14 and Table 15, p. 58.

Table 14. TOAU UC600 alarms

Point	Diagnostic	Possible Cause
1	Indoor Fan Failure	VFD not operating
		Outdoor and/or Return Air Dampers not Operating Properly
		Indoor Fan Motor Failure
		Indoor Fan Failure Switch IFFS (pressure) Failure
		IFFS Tubing damaged or not properly connected
		Refer to startup procedure
3	OAD Proving Switch	No voltage at actuator
		Failed OAD power transformer
		No continuity thru end switch (check at UC)
		Note: If unit optional RA damper is installed, send switch on OAD is always proven
6	Discharge Air Temp Source Failure	BAS communication down
		Failed sensor or improper sensor installation
8	Fire Shutdown	BAS ONLY
10	Low Temp Lockout	Heat Overridden OFF
		Compressor(s) Overridden ON
		Setpoint Failures Incorrect
		DAT sensor malfunction
		Reference Table 15, p. 58 for heat failure issues
11	Space Temp Source Failure	BAS communication down
		Failed sensor or improper sensor installation
13	OA Temp Source Failure	BAS communication down
		Failed sensor or improper sensor installation
14	OA Humidity Source Failure	BAS communication down
		Failed sensor or improper sensor installation
		Humidity Wiring is polarity sensitive
15	High Temp Lockout	Heat Overridden ON
		Low discharge air volume
		Dirty air filters
		High gas heater manifold pressure
		OA/RA damper position incorrect
		High temp limit not properly installed or wired
		DAT sensor malfunction
17	System Lockout	Check all Alarms
		External safety device failed open
19	Space RH Source Failure	BAS communication down
		Failed sensor or improper sensor installation
		Humidity Wiring is polarity sensitive
32	ERV Leaving Air Condition Failure	Failed RH or temperature sensor
		Incorrectly installed or connect RH or Temp sensor

Table 14. TOAU UC600 alarms (continued)

Point	Diagnostic	Possible Cause
42	Heat Failure	Applies to 5:1 and 10:1 Gas Heaters Only
		Trips after heat command “ON” and no GV status offer 1 minute
		Refer to unit “Service Facts” heat control LED status legend
		No gas, low gas pressure or high gas pressure to unit
		Unit Manual shutoffs closed
		Heater inducer failure
		Heat relay failure
		Loose or incorrect wiring

Table 15. TOAU UC600 troubleshooting

Trouble	Possible Cause
Unit Not Running	No power supply to unit disconnect switch
	Power disconnect tripped
	Lockout alarm mode
	Emergency Stop condition exists
	Unit in Unoccupied mode
	Discharge air sensor failed or not installed and connected to unit
No Heat	No gas supply to unit
	Unit manual gas valve(s) closed
	Heater high limit tripped
	Heat relay not energized
	Conditions do not warrant call for heat
	Heater control module malfunction
	Roll out switch trip
	Main gas on-off switch OFF
	Inducer fan failure
	Heater air proving switch not making or failed
No Compressor	Compressor limit switch(es) open
	Compressor relay not energized or failed
	Conditions do not warrant call for cooling or dehumidification
Wide Discharge Temp Swings	Discharge air sensor position must be at least 4 ft.-0 in. away from unit outlet
	Min and Max gas heater manifold pressures not set correctly
Space too Hot, Cold or Humid	Setpoints not adjusted properly
	Space sensors not correctly located or wired
	Malfunctioning space sensor
IFM or PEX VFD OC Trip	Overcurrent alarm requires max Hz setting on VFD be checked and set to not exceed motor nameplate amps
EX VFD only run to Min HZ Setting	If supplied with RA pressure transducer and modulating damper setup is not installed or properly wired.
ERV Will Not Run	ERV leaving air temp below 34°F low temp cutout
	Interlocked with Exhaust fan if exhaust is not running ERV will be OFF

Table 15. TOAU UC600 troubleshooting (continued)

Trouble	Possible Cause
Unit Trips Heater High Limit	High fire gas manifold pressure too high
	Supply fan speed too low
	Dirty or clogged filters
	Restricted discharge air duct
	Temperature of air entering heater too high
	Defective high limit
Protonode Not Communicating	Change Baud rate on UC600 to 38,400

RTRM Failure Modes

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠AVERTISSEMENT

Composants électriques sous tension!

Le non-respect de toutes les consignes de sécurité lors de la manipulation de composants électriques sous tension peut entraîner des blessures graves, voire mortelles. S'il est nécessaire de travailler avec des composants électriques sous tension, demandez à un électricien qualifié et agréé ou à une autre personne ayant la formation nécessaire pour manipuler des composants électriques sous tension d'exécuter ces tâches.

Following is the listing of RTRM failure indication causes.

System Failure

Check the voltage between RTRM terminals 6 and 9 on J6, it should read approximately 32 Vdc. If no voltage is present, a System failure has occurred. Refer to Step 4 in "Microprocessor Control," p. 57 for the recommended troubleshooting procedure.

Cooling Failure

- CLP1 has opened during the 3 minute minimum "on time" during four consecutive compressor starts, check CLP1 or CLP2 by testing voltage between the J1-8 and J3-2 terminals on the RTRM and ground. If 24 Vac is present, the CLPs have not tripped. If no voltage is present, CLPs have tripped.

System Failure

Measure the voltage between terminals J6-9 and J6-6.

Normal Operation = approximately 32 Vdc

System Failure = less than 1 Vdc, approximately 0.75 Vdc

Cool Failure

Measure the voltage between terminals J6-8 and J6-6.

Cool Operating = approximately 32 Vdc

Cool Off = less than 1 Vdc, approximately 0.75 Vdc

Cooling Failure = voltage alternates between 32 Vdc and 0.75 Vdc

Condenser Fan VFD Troubleshooting

Table 16. Status indications

Upper Row String	Description	Drive Output Stage
Inhibit	The drive is inhibited and cannot be run. The SAFE TORQUE OFF signal is not applied to SAFE TORQUE OFF terminals or Pr06.015 is set to 0.	Disabled
Ready	The drive is ready to run. The drive enable is active, but the drive inverter is not active because the final drive run is not active.	Disabled
Stop	The drive is stopped/holding zero speed.	Enabled
Run	The drive is active and running.	Enabled
Supply Loss	Supply loss condition has been detected.	Enabled
Deceleration	The motor is being decelerated to zero speed/frequency because the final drive run has been deactivated.	Enabled
Trip	The drive has tripped and is no longer controlling the motor. The trip code appears in the lower display.	Disabled
Active	The regen unit is enabled and synchronized to the supply.	Enabled
Under Voltage	The drive is in the under voltage state either in low voltage or high voltage mode.	Disabled
Heat	The motor pre-heat functions inactive.	Enabled

Appendix

OAU Filter Guide

Table 17. OAD units

Evaporator				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8, 13	6	24 (63.5)	18 (45.7)
4 (10.2)	14	6	24 (63.5)	18 (45.7)
ERV Module				
Return Air				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8	6	20 (50.8)	20 (50.8)
Outside Air[a]				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8	6	20 (50.8)	20 (50.8)
Inlet Hood				
Thickness, in. (cm)	**Material**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	Aluminum Mesh	6	20 (50.8)	20 (50.8)

(a) No filters will be provided on the outside air path of the ERV section if electric preheat is provided.

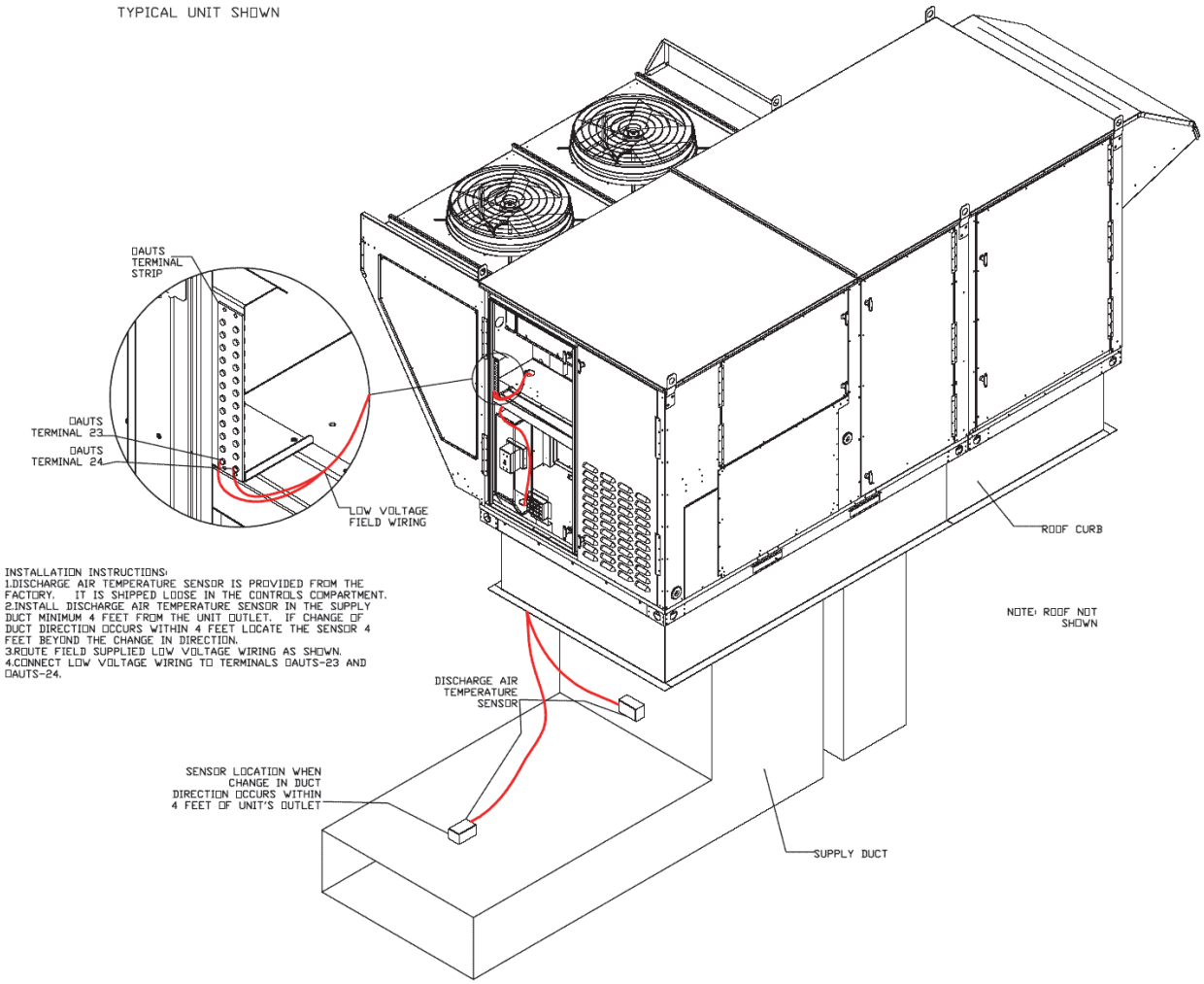
Table 18. OAN units

Evaporator (40 to 50 ton - 4 and 6 row coils; 55 to 100 ton - 6 row coils)				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8, 13	15	20 (50.8)	18 (45.7)
4 (10.2)	14	15	20 (50.8)	18 (45.7)
Evaporator (55 to 100 ton - 4 row coils)				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8, 13	12	20 (50.8)	25 (63.5)
4 (10.2)	14	12	20 (50.8)	25 (63.5
ERV Module				
Return Air				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8	15	24 (61.0)	18 (45.7)
Outside Air[a]				
Thickness, in. (cm)	**MERV**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	8	15	24 (61.0)	18 (45.7)
Inlet Hood				
Thickness, in. (cm)	**Material**	**Qty**	**Height, in. (cm)**	**Width, in. (cm)**
2 (5.1)	Aluminum Mesh	12	24 (61.0)	24 (61.0)

(a) No filters will be provided on the outside air path of the ERV section if electric preheat is provided.

Field Installation of Factory-Provided Sensors

Figure 46. VELSEN-0021 installation instructions



TRANE

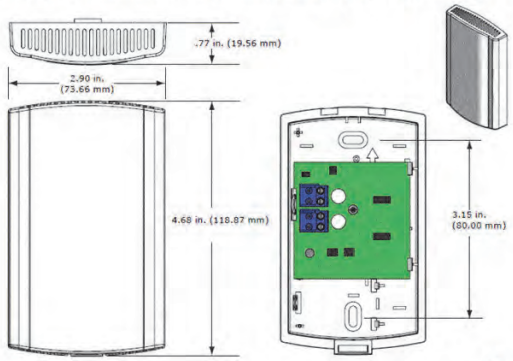
Appendix

Figure 47. BAYSENS036A installation instructions

Sensor Specifications

Accuracy:	±3% RH over 20–95% RH at 77°F (25°C). Includes hysteresis, linearity, and repeatability.
Operating temperature range:	From -20°F to 140°F (-29°C to 60°C)
Supply voltage:	18-36 Vdc
Drift rate:	Less than 1% per year
Operating measurement range:	0-99% RH, noncondensing
Sensing element:	Polymer capacitive
Output characteristics:	4-20 mA for 0-100% RH (*X13790486010 is 20- mA for 0-100% RH*)
Repeatability:	0.5% RH
Hysteresis:	Less that 1% RH
Sensitivity:	0.1% RH
Storage temperature:	From -85°F to 158°F (-65°C to 70°C)
Thermistor resistance:	10 kΩ at 77°F
Temperature accuracy:	±0.36°F (±0.2°C)

Sensor Dimensions and Locating Best Practices



Proper location of the ***room humidity sensor*** is important to ensure accurate measurement. Place the sensor in an area of the room with good air circulation.

Places to avoid when locating the sensor:

- Locations subject to draft from windows, doors, or diffusers
- Surfaces with an uncooled or unheated area behind them, such as an outside wall or the wall of an unoccupied store room
- Near heat sources, such as radiant heat from the sun, heat from appliances, or heat from concealed pipes or chimneys
- Dead spots behind doors, draperies, or in corners
- Walls having excessive vibration
- Corrosive environments such as near swimming pools or in hospital rooms

Mounting

To mount the ***room humidity sensor***, first choose a flat interior surface that is approximately 54 inches (1.4 m) from the floor and then:

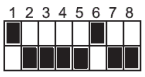
1. Remove sensor cover by pressing on the thumb tab at the bottom of the enclosure. Tilt the cover forward and raise it over the top of the back plate.
2. Feed the wires through the base.
3. Attach sensor to drywall or plaster (hardware not included with the sensor).
   Note: For a 2 × 4 junction box, mount the sensor using two #6-32 screws.
4. Connect the controller wires to the terminals on the sensor (refer to the next section about wiring).
5. Replace cover by engaging tab hinges on top of the unit and then push to snap in place.

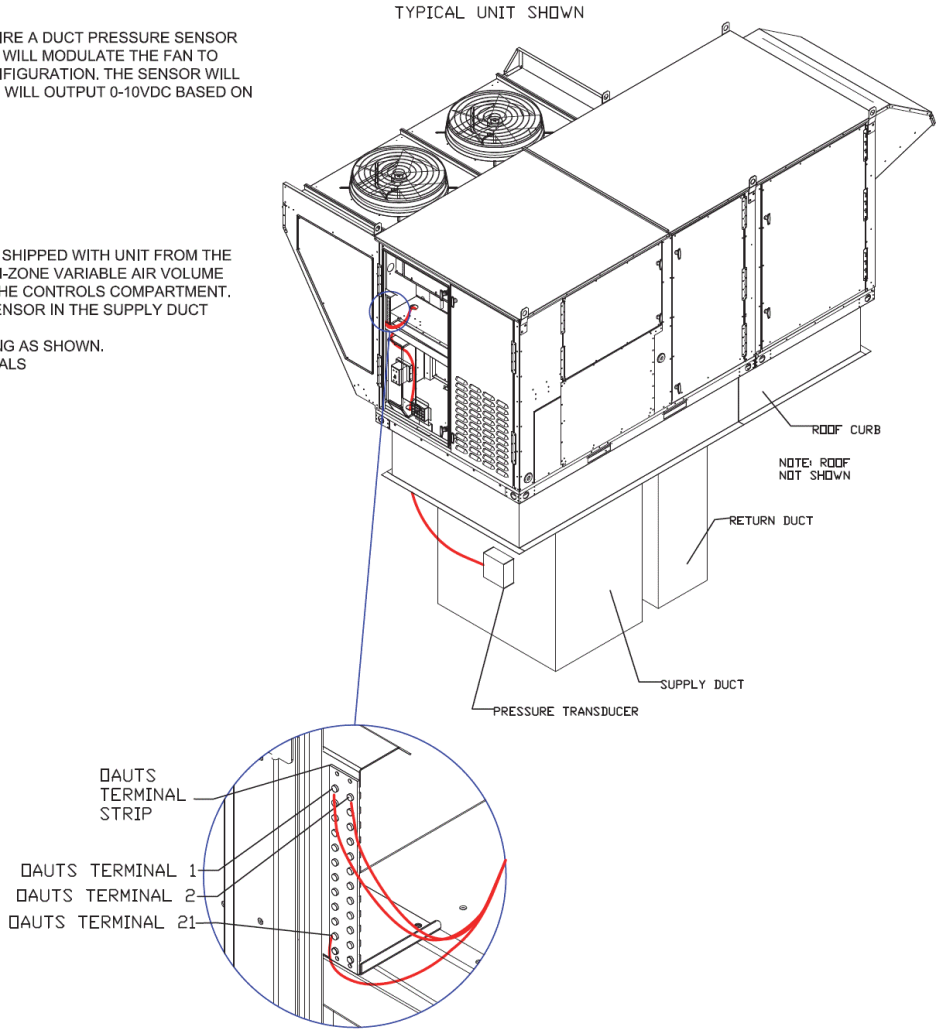
Figure 48. MZVAV DSPS document

GENERAL:
UNITS EQUIPPED WITH MULTI-ZONE VAV REQUIRE A DUCT PRESSURE SENSOR INSTALLED IN SUPPLY DUCTWORK. PROGRAM WILL MODULATE THE FAN TO MAINTAIN PRESSURE DESIGNATED IN THE CONFIGURATION. THE SENSOR WILL OUTPUT 0-10VDC TO THE CONTROLLER WHICH WILL OUTPUT 0-10VDC BASED ON THE INTERNAL CONTROLLER PROGRAMMING.

INSTALLATION INSTRUCTIONS:
1.SUPPLY DUCT STATIC PRESSURE SENSOR IS SHIPPED WITH UNIT FROM THE FACTORY WHEN UNIT IS EQUIPPED WITH MULTI-ZONE VARIABLE AIR VOLUME CONTROL OPTION. IT IS SHIPPED LOOSE IN THE CONTROLS COMPARTMENT.
2.INSTALL SUPPLY DUCT STATIC PRESSURE SENSOR IN THE SUPPLY DUCT APPROXIMATELY 4 FEET FROM THE UNIT.
3.ROUTE FIELD SUPPLIED LOW VOLTAGE WIRING AS SHOWN.
4.CONNECT LOW VOLTAGE WIRING TO TERMINALS
OAUTS-21—RED (POWER+)
OAUTS-1—BROWN (SIGNAL,0-10VDC)
OAUTS-2—BLUE (COMMON)

BAPI - DUCT PRESSURE SENSOR SETTINGS:
RANGE: 2"
OUTPUT: 0-10VDC
DIP SWITCH POSITION BELOW

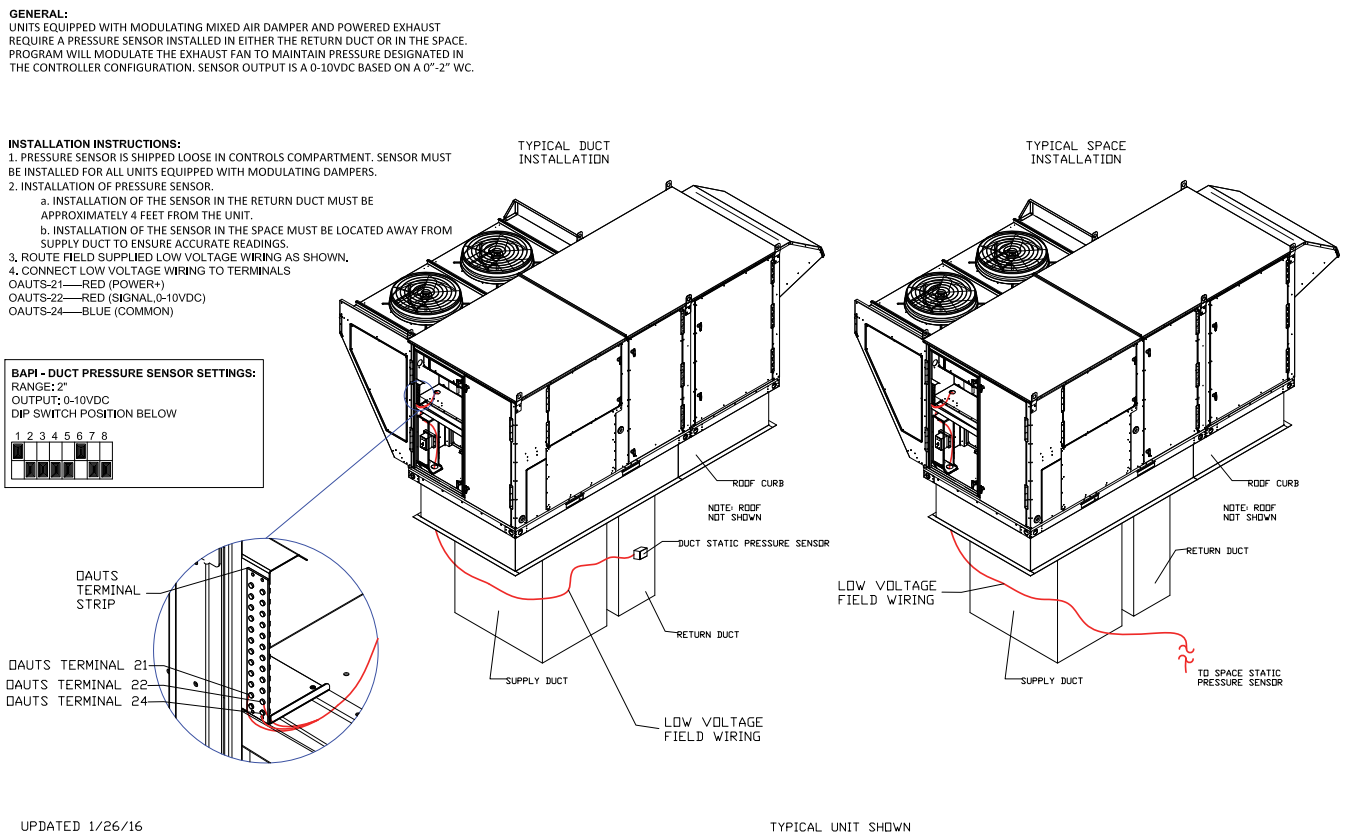




TRANE

Appendix

Figure 49. VELCON-0350 installation instructions for modulating OA/RA dampers w/economizer and an exhaust fan



Horizon™ Dedicated Outdoor Air Unit Startup Form

Date :_____

Job Name :_____

Address :_____

_____

Serial Number:_____ ***Tag*** :_____

Start up contractor : _____

Address :_____

_____

Pre Startup Checklist

Installing contractor should verify the following items.

1 . Is there any visible shipping damage? _____YES _____NO
2. Is the unit level? _____YES _____NO
3. Are the unit clearances adequate for service and operation? _____YES _____NO
4. Do all access doors open freely and are the handles operational? _____YES _____NO
5 . Have all electrical connections been tested for tightness? _____YES _____NO
6 . Does the electrical service correspond to the unit nameplate? _____YES _____NO
7. On 208/230V units, has transformer tap been checked? _____YES _____NO
8. Have the damper assemblies been inspected? _____YES _____NO
9. Are the air filters installed with proper orientation? _____YES _____NO
10. Have condensate drain and p-trap been connected? _____YES _____NO
11. Have the crankcase heaters been on for 24 hrs. _____YES _____NO

Factory supplied sensors installed

Discharge temp ☐ ***Space Temp / Humidity*** ☐

Supply Duct Pressure Transducer ☐ ***Return Duct / Space Pressure Transducer*** ☐

Filters

Quantity	*Location*	*Size*	Orientation	Clean
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐

Program Control

Non Heat Pump: Discharge	☐	*Space*	☐	*Single Zone VAV*	☐	*Multi Zone VAV*	☐
Heat Pump: Discharge	☐	*Space*	☐	*Single Zone VAV*	☐	*Multi Zone VAV*	☐

Compressors

#	*Model*	*Serial*	*L1*	*L2*	*L3*	*Amps*
1						
2						
3						
4						

TRANE

Appendix

Horizon™ Dedicated Outdoor Air Unit Startup Form

Supply Fan Assembly									
Fan 2 - Alignment ☐	Name plate amps:		Actual Amps:		Rotation ☐	Hrtz:			
Fan 2 - Alignment ☐	Name plate amps:		Actual Amps:		Rotation ☐	Hrtz:			
Energy Recover Wheel									
Wheel Spins freely ☐		Check Rotation ☐		FLA:					
Voltage	L1:	L2:	L3:		Amps:		HP:		
Power Exhaust Fan Assembly									
Fan 2 - Alignment ☐	Name plate amps:		Actual Amps:		Rotation ☐	Hrtz:			
Fan 2 - Alignment ☐	Name plate amps:		Actual Amps:		Rotation ☐	Hrtz:			

Dampers			
Damper set up	Modulating ☐	Two Position ☐	Operation check ☐

Ambient Temperature	
Ambient Dry Bulb Temperature_____°F	Ambient Wet Bulb Temperature_____°F

Condenser Configuration					
Water Cooled ☐					
No water leaks ☐		Water Flow :_____ GPM			
Water Inlet Temp :_____°F		Water Outlet Temp: _____°F			
Air Cooled ☐	L1	L2	L3	Amps	HP
Fan 1					
Fan 2					
Fan 3					
Fan 4					

Refrigeration System --Circuit 1					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

Refrigeration System --Circuit 2					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

HEATING -- Refrigeration System (Heat Pump Only) --Circuit 1					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

HEATING -- Refrigeration System (Heat Pump Only) --Circuit 2					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

Horizon™ Dedicated Outdoor Air Unit Startup Form

Water / Glycol System		
1. Has the entire system been flushed and pressure checked?	_____YES	NO_____
2. Has the entire system been filled with fluid?	_____YES	NO_____
3. Has air been bled from the heat exchangers and piping?	_____YES	NO_____
4. Is the glycol the proper type and concentration (N/A if water)?	_____YES	NO_____
6. Has the water piping been insulated?	_____YES	NO_____
7. What is the freeze point of the glycol (N/A if water)?	_____YES	NO_____

Gas Heat

Natural Gas ☐ ***Propane*** ☐ ***Purge Air from the lines*** ☐

	Low Fire	***High Fire***
Heat 1	☐	☐
Heat 2		☐
Heat 3		☐

Electric Heat				
Pre Heat:	***Amps***	***L1:***	***L2:***	***L3:***
Primary:	***Amps***	***L1:***	***L2:***	***L3:***

Ingersoll Rand (NYSE:IR) advances the quality of life by creating comfortable, sustainable and efficient environments. Our people and our family of brands—including Club Car®, Ingersoll Rand®, Thermo King® and Trane®—work together to enhance the quality and comfort of air in homes and buildings; transport and protect food and perishables; and increase industrial productivity and efficiency. We are a global business committed to a world of sustainable progress and enduring results.

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OAU-SVX006C-EN 30 Nov 2019
Supersedes OAU-SVX006B-EN (Oct 2018)

MITSUBISHI ELECTRIC

Mr.SLIM

Air-Conditioners

Indoor unit

PLA-A·AA
PKA-A·GA/PKA-A·GAL
PKA-A·FA/PKA-A·FAL
PCA-A·GA

OPERATION MANUAL

FOR USER

For safe and correct use, please read this operation manual thoroughly before operating the air-conditioner unit.

English

MANUAL DE INSTRUCCIONES

PARA EL USUARIO

Lea este manual de instrucciones hasta el final antes de poner en marcha la unidad de aire acondicionado para garantizar un uso seguro y correcto.

Español

Contents

1. Safety Precautions

- **Before installing the unit, make sure you read all the "Safety Precautions".**
- **The "Safety Precautions" provide very important points regarding safety. Make sure you follow them.**
- **Please report to or take consent by the supply authority before connection to the system.**

Symbols used in the text

⚠ Warning:
Describes precautions that should be observed to prevent danger of injury or death to the user.

⚠ Caution:
Describes precautions that should be observed to prevent damage to the unit.

Symbols used in the illustrations

⏚ : Indicates a part which must be grounded.

⚠ Warning:

- **The unit must not be installed by the user. Ask the dealer or an authorized company to install the unit. If the unit is installed improperly, water leakage, electric shock or fire may result.**
- **Do not stand on, or place any items on the unit.**
- **Do not splash water over the unit and do not touch the unit with wet hands. An electric shock may result.**
- **Do not spray combustible gas close to the unit. Fire may result.**
- **Do not place a gas heater or any other open-flame appliance where it will be exposed to the air discharged from the unit. Incomplete combustion may result.**
- **Do not remove the front panel or the fan guard from the outdoor unit when it is running.**
- **When you notice exceptionally abnormal noise or vibration, stop operation, turn off the power switch, and contact your dealer.**
- **Never insert fingers, sticks etc. into the intakes or outlets.**
- **If you detect odd smells, stop using the unit, turn off the power switch and consult your dealer. Otherwise, a breakdown, electric shock or fire may result.**
- **This air conditioner is NOT intended for use by children or infirm persons without supervision.**
- **Young children must be supervised to ensure that they do not play with the air conditioner.**
- **If the refrigeration gas blows out or leaks, stop the operation of the air conditioner, thoroughly ventilate the room, and contact your dealer.**

⚠ Caution:

- **Do not use any sharp object to push the buttons, as this may damage the remote controller.**
- **Never block or cover the indoor or outdoor unit's intakes or outlets.**

Disposing of the unit

When you need to dispose of the unit, consult your dealer.

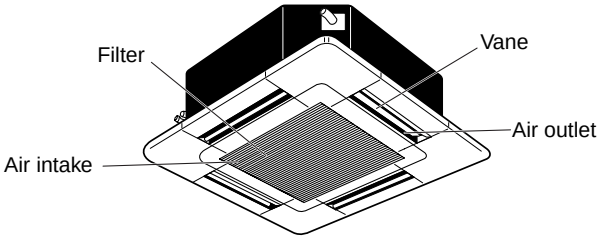
2. Parts Names

■ Indoor Unit

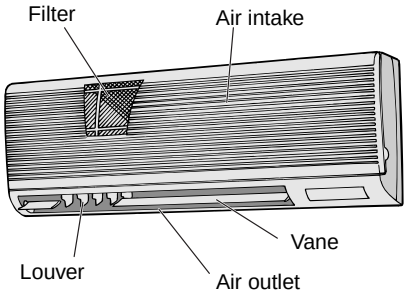
	PLA-A·AA	PKA-A·GA PKA-A·GAL	PKA-A·FA PKA-A·FAL	PCA-A·GA
Fan steps	4 steps	4 steps	2 steps	4 steps
Vane	Auto with swing	Auto with swing	Auto with swing	Auto with swing
Louver	–	Manual	Manual	Manual
Filter	Long-life	Normal	Normal	Long-life
Filter cleaning indication	2,500 hr	100 hr	100 hr	2,500 hr

2. Parts Names

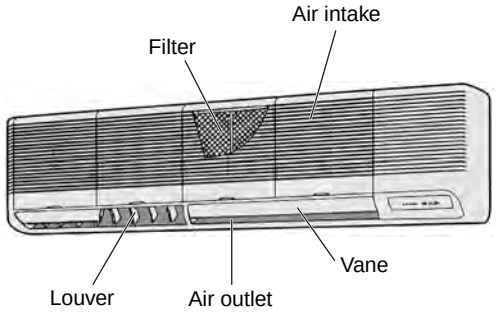
■ **PLA-A·AA**
4-way Ceiling Cassette



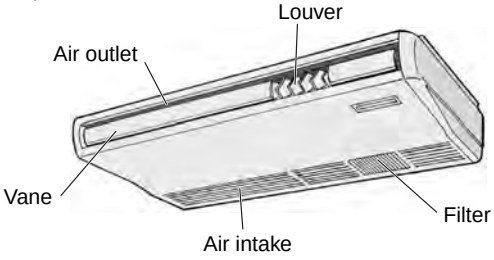
■ **PKA-A·GA/PKA-A·GAL**
Wall Mounted



■ **PKA-A·FA/PKA-A·FAL**
Wall Mounted



■ **PCA-A·GA**
Ceiling Suspended



2. Parts Names

■ **Wired Remote-Controller**

Display Section

For purposes of this explanation, all parts of the display are shown as lit. During actual operation, only the relevant items will be lit.

Day-of-Week
Shows the current day of the week.

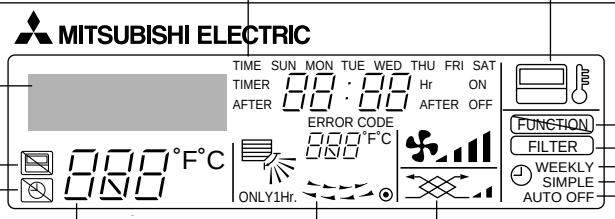
Time/Timer Display
Shows the current time, unless the simple or Auto Off timer is set.
If the simple or Auto Off timer is set, shows the time remaining.

"Sensor" indication
Displayed when the remote controller sensor is used.

"Locked" indicator
Indicates that remote controller buttons have been locked.

Identifies the current operation
Shows the operating mode, etc.
* Multilanguage display is supported.

"Clean The Filter" indicator
Comes on when it is time to clean the filter.



Timer indicators
The indicator comes on if the corresponding timer is set.

"Centrally Controlled" indicator
Indicates that operation of the remote controller has been prohibited by a master controller.

Fan Speed indicator
Shows the selected fan speed.

Ventilation indicator
Appears when the unit is running in Ventilation mode.

Up/Down Air Direction indicator
The indicator ＼ shows the direction of the outcoming airflow.

Room Temperature display
Shows the room temperature. The room temperature display range is 8–39°C. The display flashes if the temperature is less than 8 °C or 39 °C or more.

"Timer is Off" indicator
Indicates that the timer is off.

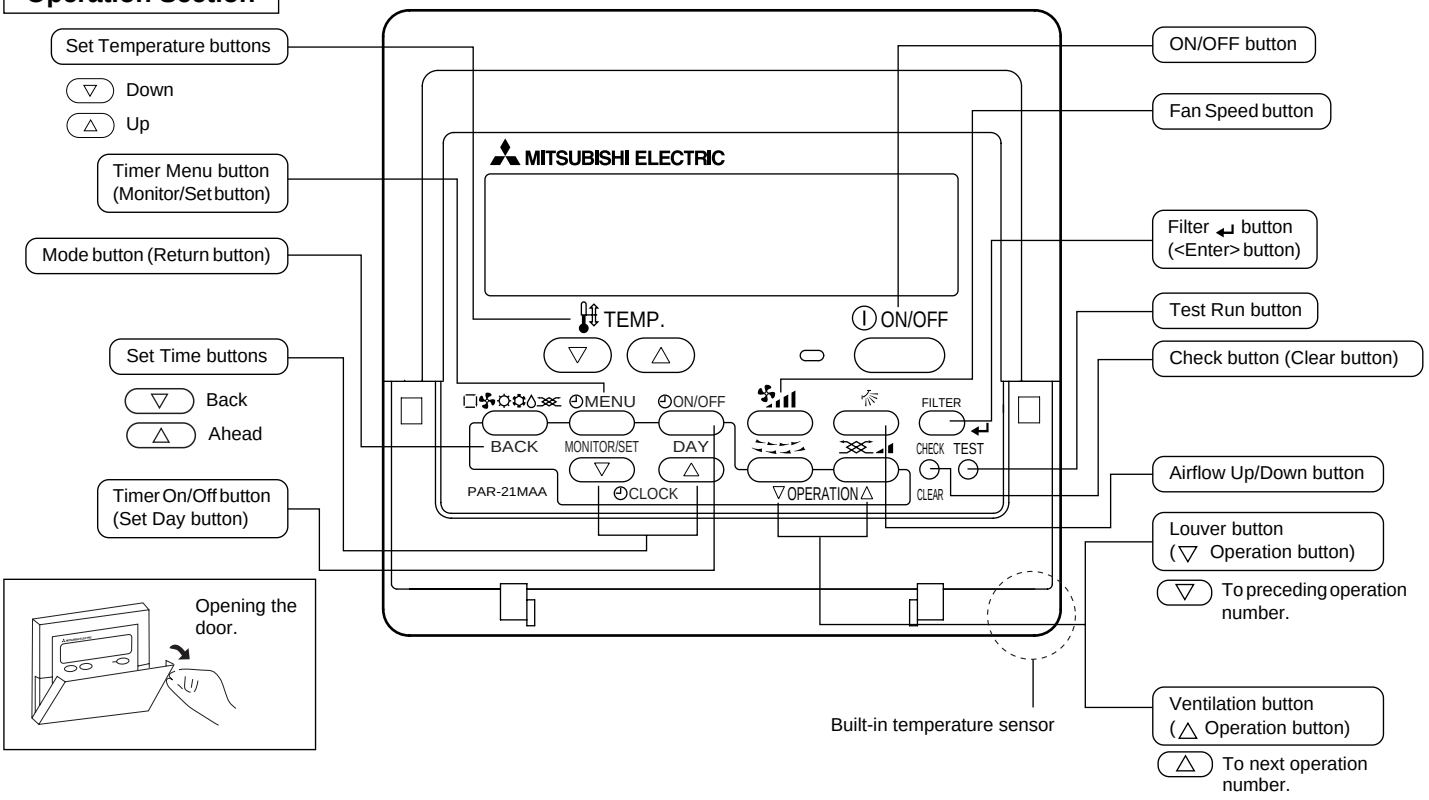
"One Hour Only" indicator
Displayed if the airflow is set to weak and downward during COOL or DRY mode. (Operation varies according to model.)
The indicator goes off after one hour, at which time the airflow direction also changes.

Louver display
Indicates the action of the swing louver. Does not appear if the louver is stationary.

Temperature Setting
Shows the target temperature.

◉ (Power On indicator)
Indicates that the power is on.

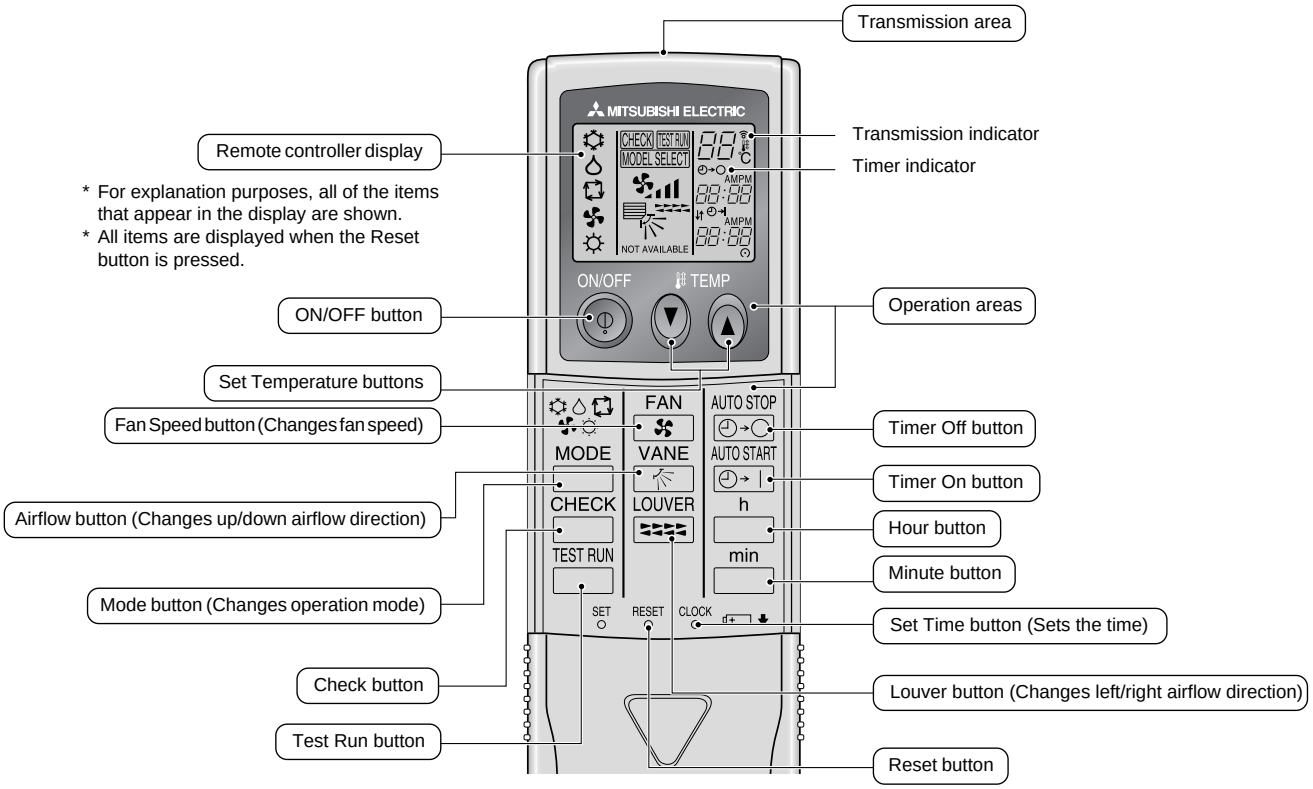
Operation Section



Note:
- "PLEASE WAIT" message
  This message is displayed for approximately 3 minutes when power is supplied to the indoor unit or when the unit is recovering from a power failure.
- "NOT AVAILABLE" message
  This message is displayed if a button is pressed to operate a function that the indoor unit does not have.
  If a single remote controller is used to simultaneously operate multiple indoor units that are different models, this message will not be displayed if any of the indoor units is equipped with the function.

2. Parts Names

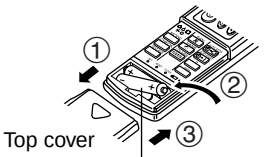
■ **Wireless Remote-Controller**



■ When using the wireless remote controller, point it towards the receiver on the indoor unit.
■ If the remote controller is operated within approximately two minutes after power is supplied to the indoor unit, the indoor unit may beep twice as the unit is performing the initial automatic check.
■ The indoor unit beeps to confirm that the signal transmitted from the remote controller has been received. Signals can be received up to approximately 7 meters in a direct line from the indoor unit in an area 45° to the left and right of the unit. However, illumination such as fluorescent lights and strong light can affect the ability of the indoor unit to receive signals.
■ If the operation lamp near the receiver on the indoor unit is flashing, the unit needs to be inspected. Consult your dealer for service.
■ Handle the remote controller carefully! Do not drop the remote controller or subject it to strong shocks. In addition, do not get the remote controller wet or leave it in a location with high humidity.
■ To avoid misplacing the remote controller, install the holder included with the remote controller on a wall and be sure to always place the remote controller in the holder after use.

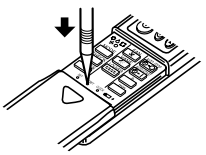
Battery installation/replacement

1. Remove the top cover, insert two AAA batteries, and then install the top cover.



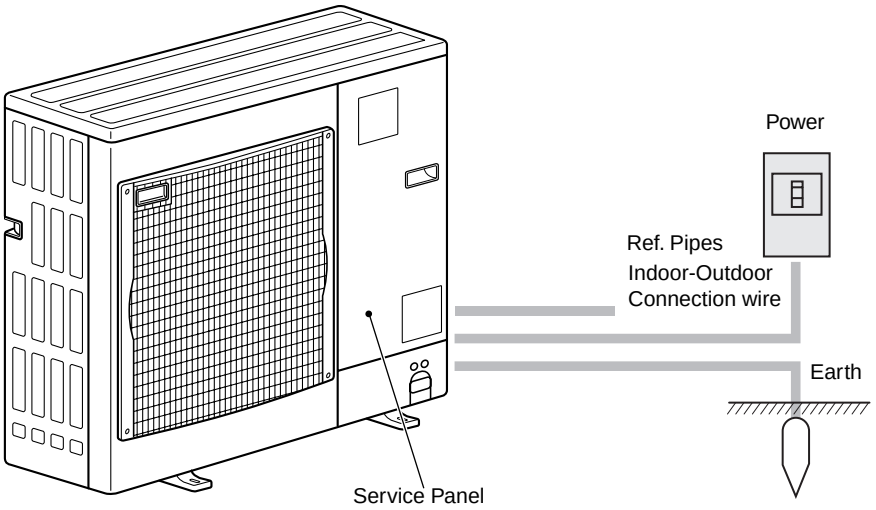
Two AAA batteries
Insert the negative (–) end of each battery first. Install the batteries in the correct directions (+, –)!

2. Press the Reset button.

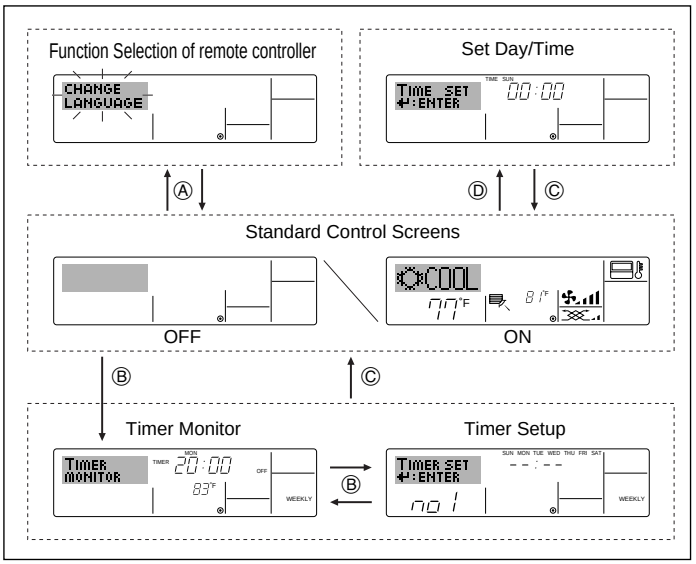


Press the Reset button with an object that has a narrow end.

■ **Outdoor unit**



3. Screen Configuration



<Screen Types>

For details on setting the language for the remote controller display, refer to section 8. Function Selection.

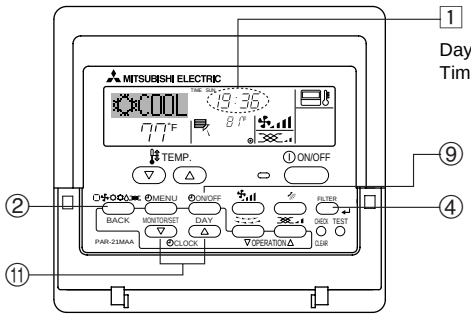
The initial language setting is English.

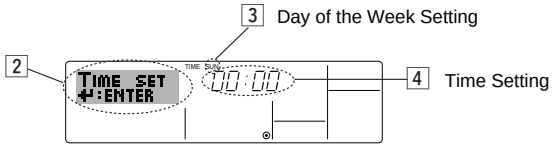
- Function Selection of remote controller: Set the functions and ranges available to the remote controller (timer functions, operating restrictions, etc.)
- Set Day/Time: Set the current day of the week or time.
- Standard Control Screens: View and set the air conditioning system's operating status
- Timer Monitor: View the currently set timer (weekly timer, simple timer, or Auto Off timer)
- Timer Setup: Set the operation of any of the timers (weekly timer, simple timer, or Auto Off timer).

<How to change the screen>

Ⓐ : Hold down both the Mode button and the Timer On/Off button for 2 seconds.
Ⓑ : Press the Timer Menu button.
Ⓒ : Press the Mode (Return) button.
Ⓓ : Press either of the Set Time buttons (▽ or △).

4. Setting the Day of the Week and Time

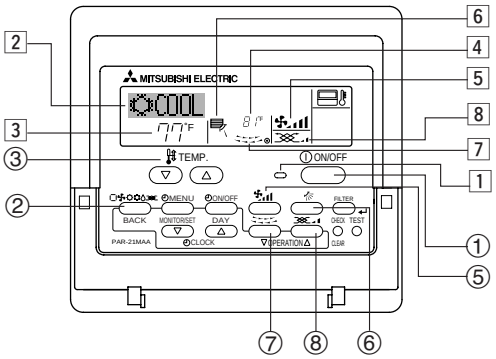


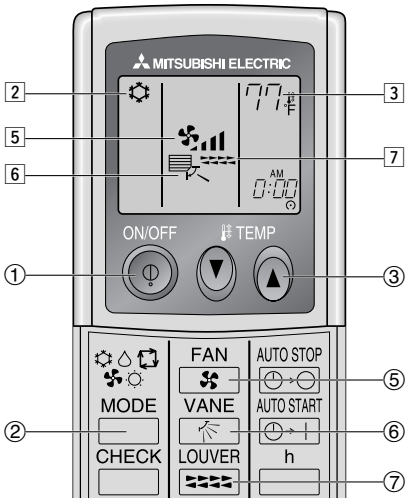


1. Press the ▽ or △ Set Time button ⑪ to show display 2.
2. Press the Timer On/Off (Set Day) button ⑨ to set the day.
   * Each press advances the day shown at 3: Sun → Mon → ... → Fri → Sat.
3. Press the appropriate Set Time button ⑪ as necessary to set the time.
   * As you hold the button down, the time (at 4) will increment first in minute intervals, then in ten-minute intervals, and then in one-hour intervals.
4. After making the appropriate settings at Steps 2 and 3, press the Filter ↵ button ④ to lock in the values.

Note:
The day and time will not appear if clock use has been disabled at Function Selection of remote controller.

5. Operation





5.1. Turning ON/OFF

<To Start Operation>

■ Press the ON/OFF button ①.
- The ON lamp 1 and the display area come on.

Note:

● **When the unit is restarted, initial settings are as follows.**

	Remote Controller settings		
Mode	Last operation mode		
Temperature setting	Last set temperature		
Fan speed	Last set fan speed		
Airflow up/down	Mode	COOL or DRY	Horiz. outlet *
		HEAT	Last setting
		FAN	Horiz. outlet *

* It will be set by last setting for wired remote controller.

5. Operation

<To Stop Operation>

■ Press the ON/OFF button ①.
- The ON lamp 1 and the display area go dark.

Note:
Even if you press the ON/OFF button immediately after shutting down the operation is progress, the air conditioner will not start for about three minutes. This is to prevent the internal components from being damaged.

5.2. Mode select

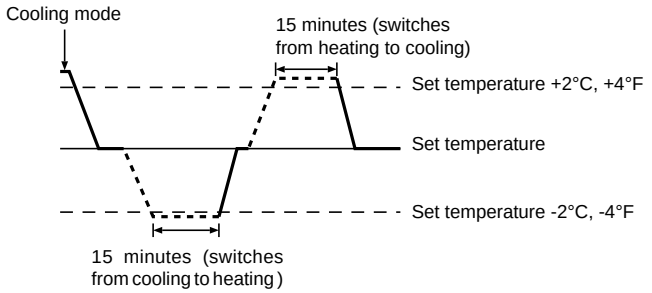
■ Press the operation mode (☐/✣/☼/♢) button ② and select the operation mode 2.

→ ☼ Cooling mode
♢ Drying mode
✣ Fan mode
☼ Heating mode
☐ Automatic (cooling/heating) mode
Ventillation mode
Only indicated on the following condition
Wired remote controller used
LOSSNAY connected

Automatic operation

■ According to a set temperature, cooling operation starts if the room temperature is too hot and heating operation starts if the room temperature is too cold.

■ During automatic operation, if the room temperature changes and remains 2 °C, 4 °F or more above the set temperature for 15 minutes, the air conditioner switches to cooling mode. In the same way, if the room temperature remains 2 °C, 4 °F or more below the set temperature for 15 minutes, the air conditioner switches to heating mode.



■ Because the room temperature is automatically adjusted in order to maintain a fixed effective temperature, cooling operation is performed a few degrees warmer and heating operation is performed a few degrees cooler than the set room temperature once the temperature is reached (automatic energy-saving operation).

5.3. Temperature setting

▶ To decrease the room temperature:
Press ▽ button ③ to set the desired temperature.
The selected temperature is displayed 3.

▶ To increase the room temperature:
Press △ button ③ to set the desired temperature.
The selected temperature is displayed 3.

- Available temperature ranges are as follows:
  Cooling/Drying: 19 - 30 °C, 67 - 87 °F
  Heating: 17 - 28 °C, 63 - 83 °F
  Automatic: 19 - 28 °C, 67 - 87 °F
- The display flashes either 8 °C - 39 °C, 46 °F - 102 °F to inform you if the room temperature is lower or higher than the displayed temperature.

5.4. Fan speed setting

■ Press the Fan Speed button ⑤ as many times as necessary while the system is running.
- Each press changes the force. The currently selected speed is shown at 5.
- The change sequence, and the available settings, are as follows.

FAN SPEED	Display
4-speed model	Speed 1 → Speed 2 → Speed 3 → Speed 4 →
2-speed model	→ →

Note:
- **The number of available fan speeds depends on the type of unit connected. Note also that some units do not provide an "Auto" setting.**
- **In the following cases, the actual fan speed generated by the unit will differ from the speed shown the remote controller display.**
  1. **While the display is showing "STAND BY" or "DEFROST".**
  2. **When the temperature of the heat exchanger is low in the heating mode. (e.g. immediately after heating operation starts)**
  3. **In HEAT mode, when room temperature is higher than the temperature setting.**
  4. **When the unit is in DRY mode.**

5.5. Airflow direction setting

<To Change the Airflow's Up/Down Direction>

■ With the unit running, press the Airflow Up/Down button ⑥ as necessary.
- Each press changes the direction. The current direction is shown at 6.
- The change sequence, and the available settings, are as follows.

Display	Horiz. → 1 → 2 → 3 → Swing →

* Note that during swing operation, the directional indication on the screen does not change in sync with the directional vanes on the unit.
* Some models do not support directional settings.

Note:
- **Available directions depend on the type of unit connected. Note also that some units do not provide an "Auto" setting.**
- **In the following cases, the actual air direction will differ from the direction indicated on the remote controller display.**
  1. **While the display is showing "STAND BY" or "DEFROST".**
  2. **Immediately after starting heater mode (while the system is waiting for the mode change to take effect).**
  3. **In heat mode, when room temperature is higher than the temperature setting.**

5. Operation

<To Change the Right/Left Air Direction>

■ Press the louver button ⑦ as necessary.
- The louver image 7 appears.
  Each press of the button switches the setting as follows.

(ON) → No display (Stop) (OFF)

During swing operation, the arrow display move to the left and right.

5.6. Ventillation

▶ For LOSSNAY combination

5.6.1. For Wired Remote-controller

● To run the ventilator together with the indoor unit:
■ Press the ON/OFF button ①.
- The Vent indication appears on the screen (at 8). The ventilator will now automatically operate whenever the indoor unit is running.

● To run the ventilator independently:
■ Press the Mode button ② until appears on the display. This will cause the ventilator to start.

● To change the ventilator force:
■ Press the Ventilation button ⑧ as necessary.
- Each press toggles the setting, as shown below.

Low ⇄ High

5.6.2. For Wireless Remote-controller

● The ventillator will automatically operate when the indoor unit turns on.
● No indication on the wireless remote controller.

6. Timer

6.1. For Wired Remote-controller

You can use Function Selection of remote controller to select which of three types of timer to use: ① Weekly timer, ② Simple timer, or ③ Auto Off timer.

6.1.1. Weekly Timer

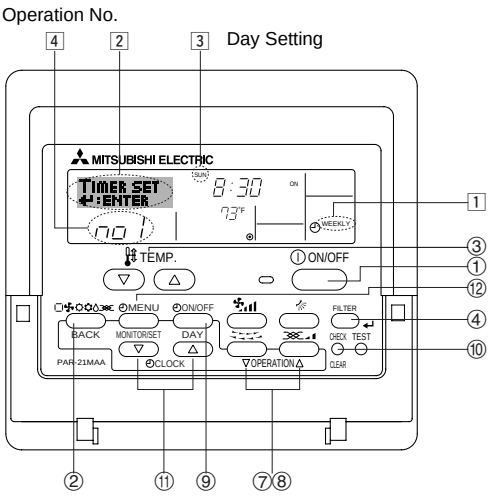
■ The weekly timer can be used to set up to eight operations for each day of the week.
- Each operation may consist of any of the following: ON/OFF time together with a temperature setting, or ON/OFF time only, or temperature setting only.
- When the current time reaches a time set at this timer, the air conditioner carries out the action set by the timer.

■ Time setting resolution for this timer is 1 minute.

Note:

***1. Weekly Timer/Simple Timer/Auto Off Timer cannot be used at the same time.**

***2. The weekly timer will not operate when any of the following conditions is in effect.**
The timer feature is off; the system is in an malfunction state; a test run is in progress; the remote controller is undergoing self-check or remote controller check; the user is in the process of setting a function; the user is in the process of setting the timer; the user is in the process of setting the current day of the week or time; the system is under central control. (Specifically, the system will not carry out operations (unit on, unit off, or temperature setting) that are prohibited during these conditions.)



<How to Set the Weekly Timer>

1. Be sure that you are at a standard control screen, and that the weekly timer indicator 1 is shown in the display.
2. Press the Timer Menu button ⑫, so that the "Set Up" appears on the screen (at 2). (Note that each press of the button toggles the display between "Set Up" and "Monitor".)
3. Press the Timer On/Off (Set Day) button ⑨ to set the day. Each press advances the display at 3 to the next setting, in the following sequence: "Sun Mon Tues Wed Thurs Fri Sat" → "Sun" → ... → "Fri" → "Sat" → "Sun Mon Tues Wed Thurs Fri Sat"...
4. Press the ▽ or △ Operation button (⑦ or ⑧) as necessary to select the appropriate operation number (1 to 8) 4.
   * Your inputs at Steps 3 and 4 will select one of the cells from the matrix illustrated below.
   (The remote-controller display at left shows how the display would appear when setting Operation 1 for Sunday to the values indicated below.)

Setup Matrix

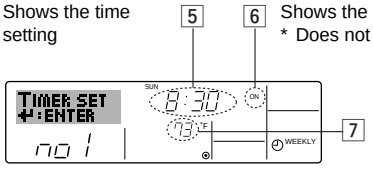
Op No.	Sunday	Monday	…	Saturday
No. 1	• 8:30 • ON • 73 °F			
No. 2	• 10:00 • OFF	• 10:00 • OFF	• 10:00 • OFF	• 10:00 • OFF
…				
No. 8				

<Operation 1 settings for Sunday>
Start the air conditioner at 8:30, with the temperature set to 73 °F.

<Operation 2 settings for every day>
Turn off the air conditioner at 10:00.

Note:
By setting the day to "Sun Mon Tues Wed Thurs Fri Sat", you can set the same operation to be carried out at the same time every day.
(Example: Operation 2 above, which is the same for all days of the week.)

<Setting the Weekly Timer>



5. Press the appropriate Set Time button ⑪ as necessary to set the desired time (at 5).
   * As you hold the button down, the time first increments in minute intervals, then in ten-minute intervals, and then in one-hour intervals.
6. Press the ON/OFF button ① to select the desired operation (ON or OFF), at 6.
   * Each press changes the next setting, in the following sequence: No display (no setting) → "ON" → "OFF"

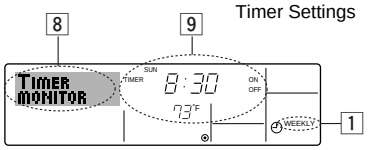
6. Timer

7. Press the appropriate Set Temperature button ③ to set the desired temperature (at 7).
   * Each press changes the setting, in the following sequence: No display (no setting) ⇔ 75 ⇔ 77 ⇔ ... ⇔ 84 ⇔ 86 ⇔ 54 ⇔ ... ⇔ 73 ⇔ No display.
   (Available range: The range for the setting is 12 °C, 54 °F to 30 °C, 86 °F. The actual range over which the temperature can be controlled, however, will vary according to the type of the connected unit.)
8. After making the appropriate settings at Steps 5, 6 and 7, press the Filter ↵ button ④ to lock in the values.
   To clear the currently set values for the selected operation, press and quickly release the Check (Clear) button ⑩ once.
   * The displayed time setting will change to "—:—", and the On/Off and temperature settings will all disappear.
   (To clear all weekly timer settings at once, hold down the Check (Clear) button ⑩ for two seconds or more. The display will begin flashing, indicating that all settings have been cleared.)

   Note:
   Your new entries will be cancelled if you press the Mode (Return) button ② before pressing the Filter ↵ button ④.
   If you have set two or more different operations for exactly the same time, only the operation with the highest Operation No. will be carried out.

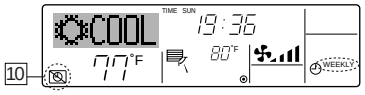
9. Repeat Steps 3 to 8 as necessary to fill as many of the available cells as you wish.
10. Press the mode (Return) button ② to return to the standard control screen and complete the setting procedure.
11. To activate the timer, press the Timer On/Off button ⑨, so that the "Timer Off" indication disappears from the screen. **Be sure that the "Timer Off" indication is no longer displayed.**
    * If there are no timer settings, the "Timer Off" indication will flash on the screen.

<How to View the Weekly Timer Settings>

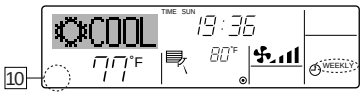


1. Be sure that the weekly timer indicator is visible on the screen (at 1).
2. Press the Timer Menu button ⑫ so that "Monitor" is indicated on the screen (at 8).
3. Press the Timer On/Off (Set Day) button ⑨ as necessary to select the day you wish to view.
4. Press the ▽ or △ Operation button (⑦ or ⑧) as necessary to change the timer operation shown on the display (at 9).
   * Each press will advance to the next timer operation, in order of time setting.
5. To close the monitor and return to the standard control screen, press the Mode (Return) button ②.

<To Turn Off the Weekly Timer>
Press the Timer On/Off button ⑨ so that "Timer Off" appears at 10.



<To Turn On the Weekly Timer>
Press the Timer On/Off button ⑨ so that the "Timer Off" indication (at 10) goes dark.

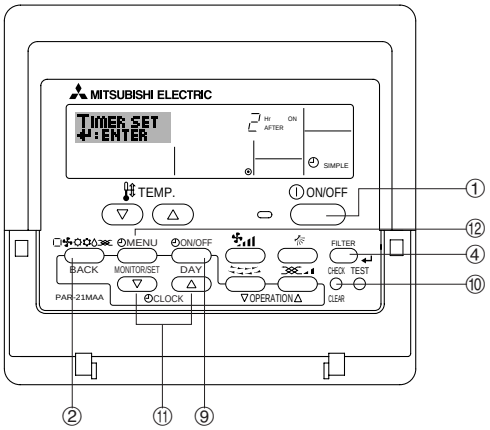


6.1.2. Simple Timer

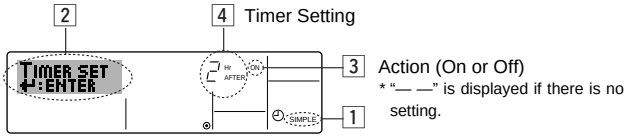
■ You can set the simple timer in any of three ways.
- Start time only:
  The air conditioner starts when the set time has elapsed.
- Stop time only:
  The air conditioner stops when the set time has elapsed.
- Start & stop times:
  The air conditioner starts and stops at the respective elapsed times.

■ The simple timer (start and stop) can be set only once within a 72-hour period.
The time setting is made in hour increments.

Note:
***1. Weekly Timer/Simple Timer/Auto Off Timer cannot be used at the same time.**
***2. The simple timer will not operate when any of the following conditions is in effect.**
The timer is off; the system is in malfunction state; a test run is in progress; the remote controller is undergoing self-check or remote controller check; the user is in the process of selecting a function; the user is in the process of setting the timer; the system is under central control. (Under these conditions, On/Off operation is prohibited.)



<How to Set the Simple Timer>



1. Be sure that you are at a standard control screen, and that the simple timer indicator is visible in the display (at 1).
   When something other than the Simple Timer is displayed, set it to SIMPLE TIMER using the function selection of remote controller (see 8.[4]–3 (3)) timer function setting.
2. Press the Timer Menu button ⑫, so that the "Set Up" appears on the screen (at 2). (Note that each press of the button toggles the display between "Set Up" and "Monitor".)
3. Press the ON/OFF button ① to display the current ON or OFF simple timer setting. Press the button once to display the time remaining to ON, and then again to display the time remaining to OFF. (The ON/OFF indication appears at 3).
   - "ON" timer:
     The air conditioner will start operation when the specified number of hours has elapsed.
   - "OFF" timer:
     The air conditioner will stop operation when the specified number of hours has elapsed.
4. With "ON" or "OFF" showing at 3: Press the appropriate Set Time button ⑪ as necessary to set the hours to ON (if "ON" is displayed) or the hours to OFF (if "OFF" is displayed) at 4.
   - Available Range: 1 to 72 hours
5. To set both the ON and OFF times, repeat Steps 3 and 4.
   * Note that ON and OFF times cannot be set to the same value.
6. To clear the current ON or OFF setting: Display the ON or OFF setting (see step 3) and then press the Check (Clear) button ⑩ so that the time setting clears to "—" at 4. (If you want to use only an ON setting or only an OFF setting, be sure that the setting you do not wish to use is shown as "—".)

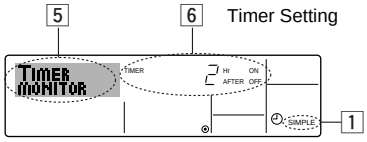
6. Timer

7. After completing steps 3 to 6 above, press the Filter ↵ button ④ to lock in the value.

Note:
Your new settings will be cancelled if you press the Mode (Return) button ② before pressing the Filter ↵ button ④.

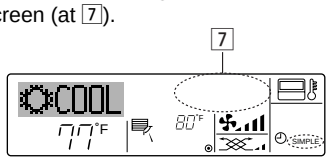
8. Press the Mode (Return) button ② to return to the standard control screen.
9. Press the Timer On/Off button ⑨ to start the timer countdown. When the timer is running, the timer value is visible on the display. **Be sure that the timer value is visible and appropriate.**

<Viewing the Current Simple Timer Settings>

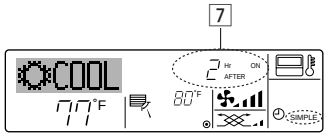


1. Be sure that the simple timer indicator is visible on the screen (at 1).
2. Press the Timer Menu button ⑫, so that the "Monitor" appears on the screen (at 5).
   - If the ON or OFF simple timer is running, the current timer value will appear at 6.
   - If ON and OFF values have both been set, the two values appear alternately.
3. Press the Mode (Return) button ② to close the monitor display and return to the standard control screen.

<To Turn Off the Simple Timer...>
Press the Timer On/Off button ⑨ so that the timer setting no longer appears on the screen (at 7).

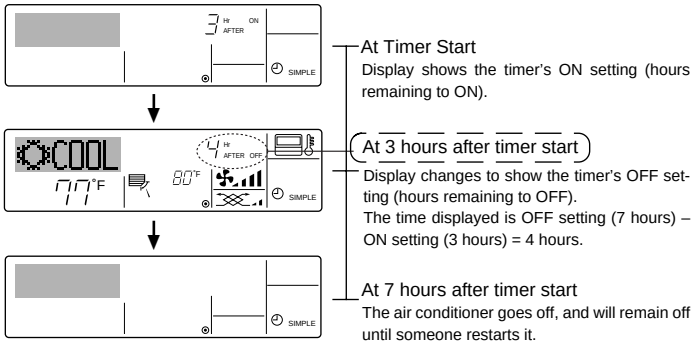


<To Turn On the Simple Timer...>
Press the Timer On/Off button ⑨ so that the timer setting becomes visible at 7.

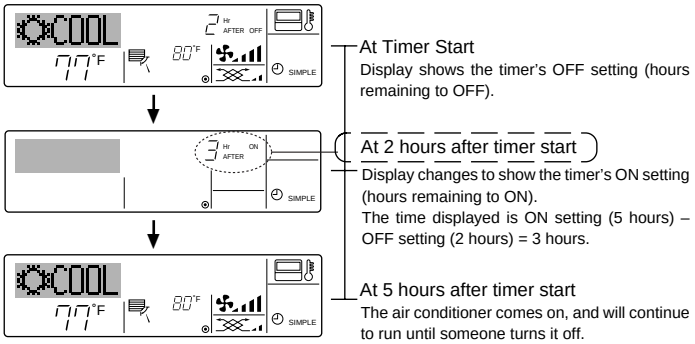


Examples
If ON and OFF times have both been set at the simple timer, operation and display are as indicated below.

Example 1:
Start the timer, with ON time set sooner than OFF time
ON Setting: 3 hours
OFF Setting: 7 hours



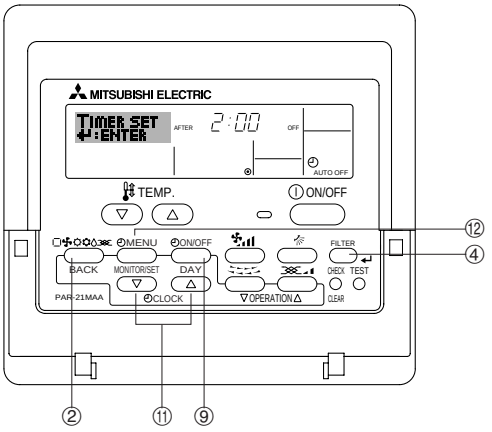
Example 2:
Start the timer, with OFF time is sooner than ON time
ON Setting: 5 hours
OFF Setting: 2 hours



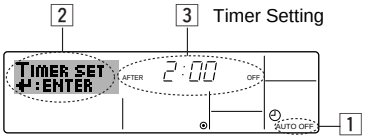
6.1.3. Auto Off Timer

■ This timer begins countdown when the air conditioner starts, and shuts the air conditioner off when the set time has elapsed.
■ Available settings run from 30 minutes to 4 hours, in 30-minute intervals.

Note:
***1. Weekly Timer/Simple Timer/Auto Off Timer cannot be used at the same time.**
***2. The Auto Off timer will not operate when any of the following conditions is in effect.**
The timer is off; the system is in malfunction state; a test run is in progress; the remote controller is undergoing self-check or remote controller check; the user is in the process of selecting a function; the user is in the process of setting the timer; the system is under central control. (Under these conditions, On/Off operation is prohibited.)



<How to Set the Auto Off Timer>



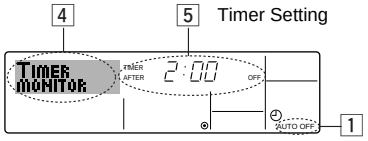
1. Be sure that you are at a standard control screen, and that the Auto Off timer indicator is visible in the display (at 1).
   When something other than the Auto Off Timer is displayed, set it to AUTO OFF TIMER using the function selection of remote controller (see 8.[4]–3 (3)) timer function setting.
2. Hold down the Timer Menu button ⑫ for **3 seconds**, so that the "Set Up" appears on the screen (at 2).
   (Note that each press of the button toggles the display between "Set Up" and "Monitor".)
3. Press the appropriate Set Time button ⑪ as necessary to set the OFF time (at 3).
4. Press the Filter ↵ button ④ to lock in the setting.

Note:
Your entry will be cancelled if you press the Mode (Return) button ② before pressing the Filter ↵ button ④.

5. Press the Mode (Return) button ② to complete the setting procedure and return to the standard control screen.
6. If the air conditioner is already running, the timer starts countdown immediately. **Be sure to check that the timer setting appears correctly on the display.**

6. Timer

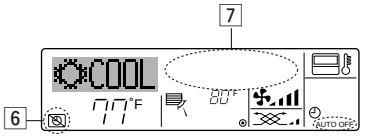
<Checking the Current Auto Off Timer Setting>



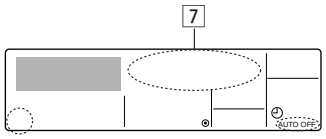
1. Be sure that the "Auto Off" is visible on the screen (at 1).
2. Hold down the Timer Menu button ⑫ for **3 seconds**, so that "Monitor" is indicated on the screen (at 4).
   • The timer remaining to shutdown appears at 5.
3. To close the monitor and return to the standard control screen, press the Mode (Return) button ②.

<To Turn Off the Auto Off Timer...>

● Hold down the Timer On/Off button ⑨ for **3 seconds**, so that "Timer Off" appears (at 6) and the timer value (at 7) disappears.



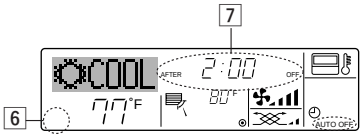
● Alternatively, turn off the air conditioner itself. The timer value (at 7) will disappear from the screen.



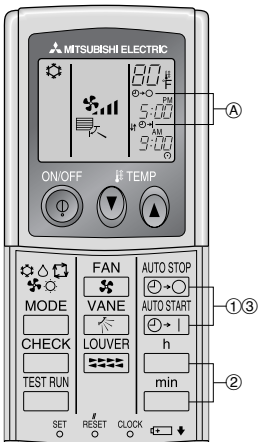
<To Turn On the Auto Off Timer...>

● Hold down the Timer On/Off button ⑨ for **3 seconds**. The "Timer Off" indication disappears (at 6), and the timer setting comes on the display (at 7).

● Alternatively, turn on the air conditioner. The timer value will appear at 7.



6.2. For wireless remote controller



① Press the AUTO STOP or AUTO START button (TIMER SET).

• Time can be set while the following symbol is blinking.
OFF timer: Ⓐ is blinking.
ON timer: Ⓐ is blinking.
② Use the h and min buttons to set the desired time.
③ Canceling the timer.
To cancel the OFF timer, press the AUTO STOP button.
To cancel the ON timer, press the AUTO START button.

• It is possible to combine both OFF and ON timers.
• Pressing the ① ON/OFF button of the remote controller during timer mode to stop the unit will cancel the timers.
• If the current time has not been set, the timer operation cannot be used.

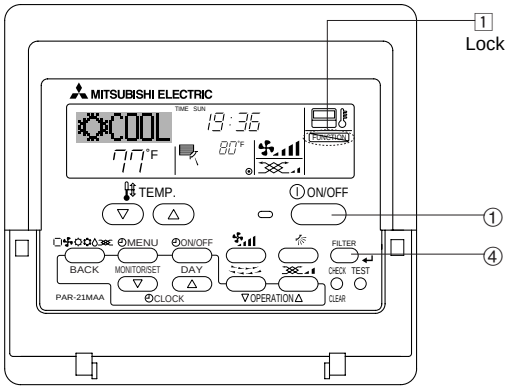
7. Other Functions

7.1. Locking the Remote Controller Buttons (Operation function limit controller)

■ If you wish, you can lock the remote controller buttons. You can use the Function Selection of remote controller to select which type of lock to use. (For information about selecting the lock type, see section 8, item [4]–2 (1)).
Specifically, you can use either of the following two lock types.

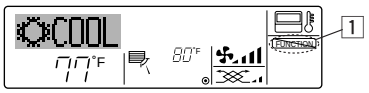
① Lock All Buttons:
Locks all of the buttons on the remote controller.
② Lock All Except ON/OFF:
Locks all buttons other than the ON/OFF button.

Note:
The "Locked" indicator appears on the screen to indicate that buttons are currently locked.

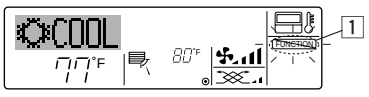


<How to Lock the Buttons>

1. While holding down the Filter button ④, press and hold down the ON/OFF button ① for 2 seconds. The "Locked" indication appears on the screen (at 1), indicating that the lock is now engaged.
   * If locking has been disabled in Function Selection of remote controller, the screen will display the "Not Available" message when you press the buttons as described above.

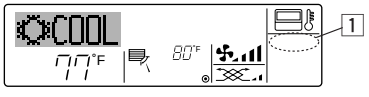


   • If you press a locked button, the "Locked" indication (at 1) will blink on the display.



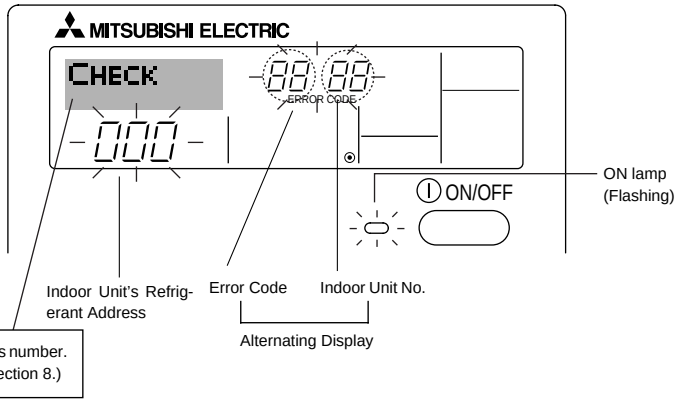
<How to Unlock the Buttons>

1. While holding down the Filter button ④, press and hold down the ON/OFF button ① for 2 seconds—so that the "Locked" indication disappears from the screen (at 1).



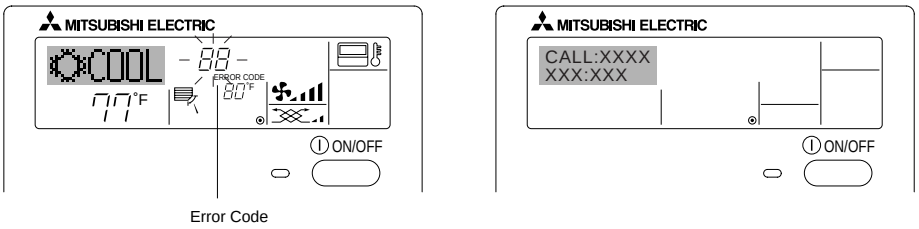
7. Other Functions

7.2. Error Codes indication



● If the ON lamp and error code are both flashing: This means that the air conditioner is out of order and operation has been stopped (and cannot resume). Take note of the indicated unit number and error code, then switch off the power to the air conditioner and call your dealer or servicer.

When the Check button is pressed:



● If only the error code is flashing (while the ON lamp remains lit): Operation is continuing, but there may be a problem with the system. In this case, you should note down the error code and then call your dealer or servicer for advice.

* If you have entered contact number to be called in the event of a problem, push the Check button to display it on the screen. (You can set this up under Function Selection of remote controller. For information, refer to section 8.)

8. Function Selection

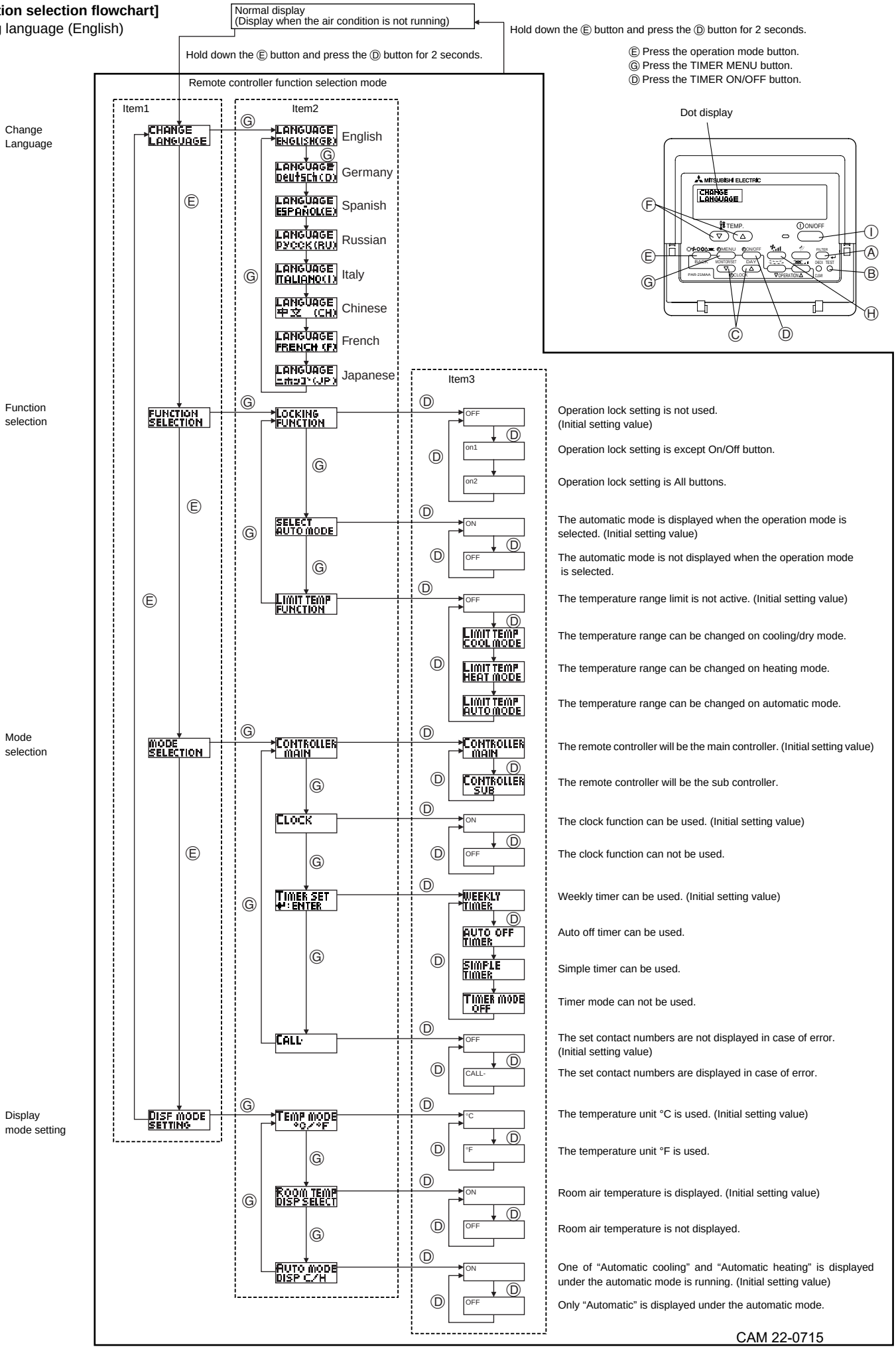
Function selection of remote controller

The setting of the following remote controller functions can be changed using the remote controller function selection mode. Change the setting when needed.

Item 1	Item 2	Item 3 (Setting content)
1. Change Language (“CHANGE LANGUAGE”)	Language setting to display	• Display in multiple languages is possible
2. Function limit (“FUNCTION SELECTION”)	(1) Operation function limit setting (operation lock) (“LOCKING FUNCTION”)	• Setting the range of operation limit (operation lock)
	(2) Use of automatic mode setting (“SELECT AUTO MODE”)	• Setting the use or non-use of “automatic” operation mode
	(3) Temperature range limit setting (“LIMIT TEMP FUNCTION”)	• Setting the temperature adjustable range (maximum, minimum)
3. Mode selection (“MODE SELECTION”)	(1) Remote controller main/sub setting (“CONTROLLER MAIN/SUB”)	• Selecting main or sub remote controller * When two remote controllers are connected to one group, one controller must be set to sub.
	(2) Use of clock setting (“CLOCK”)	• Setting the use or non-use of clock function
	(3) Timer function setting (“WEEKLY TIMER”)	• Setting the timer type
	(4) Contact number setting for error situation (“CALL.”)	• Contact number display in case of error • Setting the telephone number
4. Display change (“DISP MODE SETTING”)	(1) Temperature display °C/°F setting (“TEMP MODE °C/°F”)	• Setting the temperature unit (°C or °F) to display
	(2) Suction air temperature display setting (“ROOM TEMP DISP SELECT”)	• Setting the use or non-use of the display of indoor (suction) air temperature
	(3) Automatic cooling/heating display setting (“AUTO MODE DISP C/H”)	• Setting the use or non-use of the display of “Cooling” or “Heating” display during operation with automatic mode

8. Function Selection

[Function selection flowchart]
Setting language (English)



8. Function Selection

[Detailed setting]

[4]–1. CHANGE LANGUAGE setting

The language that appears on the dot display can be selected.

- Press the [◴MENU] button Ⓖ to change the language.
  ① English (GB), ② German (D), ③ Spanish (E), ④ Russian (RU), ⑤ Italian (I), ⑥ Chinese (CH), ⑦ French (F), ⑧ Japanese (JP)

Refer to the dot display table.

[4]–2. Function limit

(1) Operation function limit setting (operation lock)

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① no1: Operation lock setting is made on all buttons other than the [①ON/OFF] button.
  ② no2: Operation lock setting is made on all buttons.
  ③ OFF (Initial setting value): Operation lock setting is not made.

* To make the operation lock setting valid on the normal screen, it is necessary to press buttons (Press and hold down the [FILTER] and [①ON/OFF] buttons at the same time for two seconds.) on the normal screen after the above setting is made.

(2) Use of automatic mode setting

When the remote controller is connected to the unit that has automatic operation mode, the following settings can be made.

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① ON (Initial setting value):
  The automatic mode is displayed when the operation mode is selected.
  ② OFF:
  The automatic mode is not displayed when the operation mode is selected.

(3) Temperature range limit setting

After this setting is made, the temperature can be changed within the set range.

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① LIMIT TEMP COOL MODE:
  The temperature range can be changed on cooling/dry mode.
  ② LIMIT TEMP HEAT MODE:
  The temperature range can be changed on heating mode.
  ③ LIMIT TEMP AUTO MODE:
  The temperature range can be changed on automatic mode.
  ④ OFF (initial setting): The temperature range limit is not active.

* When the setting, other than OFF, is made, the temperature range limit setting on cooling, heating and automatic mode is made at the same time. However, the range cannot be limited when the set temperature range has not changed.

- To increase or decrease the temperature, press the [TEMP. (▽) or (△)] button Ⓕ.
- To switch the upper limit setting and the lower limit setting, press the [] button Ⓗ. The selected setting will flash and the temperature can be set.
- Settable range
  Cooling/Dry mode:
  Lower limit:19°C ~ 30°C, 67°F ~ 87°F
  Upper limit:30°C ~ 19°C, 87°F ~ 67°F
  Heating mode:
  Lower limit:17°C ~ 28°C, 63°F ~ 83°F
  Upper limit:28°C ~ 17°C, 83°F ~ 63°F
  Automatic mode:
  Lower limit:19°C ~ 28°C, 67°F ~ 83°F
  Upper limit:28°C ~ 19°C, 83°F ~ 67°F

[4]–3. Mode selection setting

(1) Remote controller main/sub setting

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① Main: The controller will be the main controller.
  ② Sub: The controller will be the sub controller.

(2) Use of clock setting

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① ON: The clock function can be used.
  ② OFF: The clock function cannot be used.

(3) Timer function setting

- To switch the setting, press the [◴ON/OFF] button Ⓓ (Choose one of the followings.).
  ① WEEKLY TIMER (initial setting value):
  The weekly timer can be used.
  ② AUTO OFF TIMER:
  The auto off timer can be used.
  ③ SIMPLE TIMER:
  The simple timer can be used.
  ④ TIMER MODE OFF:
  The timer mode cannot be used.

* When the use of clock setting is OFF, the “WEEKLY TIMER” cannot be used.

(4) Contact number setting for error situation

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① CALL OFF:
  The set contact numbers are not displayed in case of error.
  ② CALL **** *** ****:
  The set contact numbers are displayed in case of error.
  CALL_:
  The contact number can be set when the display is as shown on the left.
- Setting the contact numbers
  To set the contact numbers, follow the following procedures. Move the flashing cursor to set numbers. Press the [TEMP. (▽) and (△)] button Ⓕ to move the cursor to the right (left). Press the [◴CLOCK (▽) and (△)] button Ⓒ to set the numbers.

[4]–4. Display change setting

(1) Temperature display °C/°F setting

- To switch the setting, press the [◴ ON/OFF] button Ⓓ.
  ① °C: The temperature unit °C is used.
  ② °F: The temperature unit °F is used.

(2) Suction air temperature display setting

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① ON: The suction air temperature is displayed.
  ② OFF: The suction air temperature is not displayed.

(3) Automatic cooling/heating display setting

- To switch the setting, press the [◴ON/OFF] button Ⓓ.
  ① ON:
  One of “Automatic cooling” and “Automatic heating” is displayed under the automatic mode is running.
  ② OFF:
  Only “Automatic” is displayed under the automatic mode.

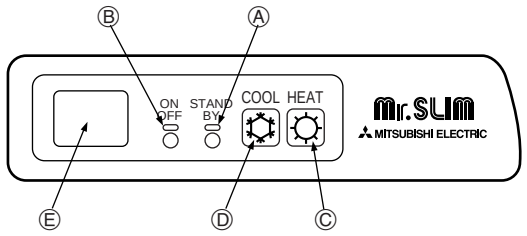
8. Function Selection

[Dot display table]

Selecting language		English	Germany	Spanish	Russian	Italy	Chinese	French	Japanese
Waiting for start-up		PLEASE WAIT	←	←	←	←	←	←	←
Operation mode	Cool	COOL	Kühlen	FRÍO	Холод	COOL	制冷	FROID	冷房
	Dry	DRY	Trocknen	DESHUMI-DIFICACION	Сушка	DRY	除湿	DESHU	ドライ
	Heat	HEAT	Heizen	CALOR	Тепло	HEAT	制热	CHAUD	暖房
	Auto	AUTO	AUTO	AUTO-MÁTICO	Авто	AUTO	自动	AUTO	自動
	Auto(Cool)	COOL	Kühlen	FRÍO	Холод	COOL	制冷	FROID	冷房
	Auto(Heat)	HEAT	Heizen	CALOR	Тепло	HEAT	制热	CHAUD	暖房
	Fan	FAN	Lüfter	VENTI-LACIÓN	Вент	VENTI LAZIONE	送风	VENTI LATION	送風
	Ventilation	VENTI LATION	Gebläse betrieb	VENTI-LACIÓN	Вентиляция	ARIA ESTERNA	换气	VENTI LATION	換気
	Stand by (Hot adjust)	STAND BY	STAND BY	CALENTANDO	Обогрев: пауза	STAND BY	准备中	PRE CHAUFFAGE	準備中
	Defrost	DEFROST	Abtauen	DESCONGE-LACIÓN	Оттаивание	SBRINA MENTO	除霜中	DEGIVRAGE	霜取中
Set temperature		SET TEMP	TEMP einstellen	TEMP. CONSIGNA	Целевая температура	IMPOSTAZIONE TEMPERTURA	设定温度	REGLAGE TEMPERATURE	設定温度
Fan speed		FAN SPEED	Lüftergesch windigkeit	VELOCIDAD VENTILADOR	Скорость вентилятора	VELOCITA' VENTILATORE	风速	VITESSE DE VENTILATION	風速
Not use button		NOT AVAILABLE	nicht Verfugbar	NO DISPONIBLE	Не доступно	NON DISPONIBILE	无效按钮	NON DISPONIBLE	無効ボタン
Check (Error)		CHECK	Prüfen	COMPROBAR	Проверка	CHECK	检查	CONTROLE	点検
Test run		TEST RUN	Testbetrieb	TEST FUNCIO NAMIENTO	Тестовый запуск	TEST RUN	试运转	TEST	試ウンテン
Self check		SELF CHECK	selbst-diagnose	AUTO REVISIÓN	Самодиагностика	SELF CHECK	自我诊断	AUTO CONTROLE	自己ｼﾝﾀﾞﾝ
Unit function selection		FUNCTION SELECTION	Funktion sauswahl	SELECCIÓN DE FUNCIÓN	Выбор функции	SELEZIONE FUNZIONI	功能选择	SELECTION FONCTIONS	ｷﾉｳ選択
Setting of ventilation		SETTING OF VENTILATION	Lüfterstufen wahlen	CONFIG. VENTILACIÓN	Настройка вентустан.	IMPOSTAZIONE ARIA ESTERNA	换气设定	SELECTION VENTILATION	換気設定

Selecting language	English	Germany	Spanish	Russian	Italy	Chinese	French	Japanese
CHANGE LANGUAGE	CHANGE LANGUAGE	←	←	←	←	←	←	←
Function selection	FUNCTION SELECTION	Funktion auswahlen	SELECCIÓN DE FUNCIONES	Выбор функции	SELEZIONE FUNZIONI	功能限制	SELECTION FONCTIONS	ｷﾉｳ制限
Operation function limit setting	LOCKING FUNCTION	Sperr – Funktion	FUNCIÓN BLOQUEADA	Функция блокировки	BLOCCO FUNZIONI	操作限制	BLOCAGE FONCTIONS	操作ﾓｰﾄﾞｲﾝｼﾞ
Use of automatic mode setting	SELECT AUTO MODE	Auswahl Auto betrieb	SELECCIÓN MODO AUTO	Выбор режима авто	SELEZIONE MODO AUTO	自动模式	SELECTION DU MODE AUTO	自動ﾓｰﾄﾞｼｮｳ
Temperature range limit setting	LIMIT TEMP FUNCTION	Limit Temp Funktion	LÍMIT TEMP CONSIGNA	Ограничение уст. температ	LIMITAZIONE TEMPERATURA	温度限制	LIMITATION TEMPERATURE	温度制限
Limit temperature cooling/day mode	LIMIT TEMP COOL MODE	Limit Kuhl Temp	LÍMIT TEMP MODO FRIO	Ограничено охлаждение	LIMITAZIONE MODO COOL	制冷范围	LIMITE TEMP MODE FROID	ﾎｳﾄﾞｳ冷房
Limit temperature heating mode	LIMIT TEMP HEAT MODE	Limit Heiz Temp	LÍMIT TEMP MODO CALOR	Ограничен обогрев	LIMITAZIONE MODO HEAT	制热范围	LIMITE TEMP MODE CHAUD	ﾎｳﾄﾞｳ暖房
Limit temperature auto mode	LIMIT TEMP AUTO MODE	Limit AUTO Temp	LÍMIT TEMP MODO AUTO	Ограничен режим авто	LIMITAZIONE MODO AUTO	自动范围	LIMITE TEMP MODE AUTO	ﾎｳﾄﾞｳ自動
Mode selection	MODE SELECTION	Betriebsart wahlen	SELECCIÓN DE MODO	Выбор режима	SELEZIONE MODO	基本模式	SELECTION DU MODE	基本ｷﾉｳ
Remote controller setting MAIN	CONTROLLER MAIN	Haupt Controller	CONTROL PRINCIPAL	Основной пульт	CONTROLLO MAIN	遥控 主	TELECOMMANDE MAITRE	ﾘﾓｺﾝ 主従
Remote controller setting SUB	CONTROLLER SUB	Neben Controller	CONTROL SECUNDARIO	Дополнительный пульт	CONTROLLO SUB	遥控 辅	TELECOMMANDE ESCLAVE	ﾘﾓｺﾝ 主従
Use of clock setting	CLOCK	Uhr	RELOJ	Часы	OROLOGIO	时钟	AFFICHAGE HORLOGE	時計ｼｮｳ
Setting the day of the week and time	TIME SET ↵:ENTER	Uhr stellen ↵:einstellen	CONFIG RELOJ ↵:CONFIG	Часы: уст. ↵: ввод	OROLOGIO ↵:ENTER	时间 ↵:ENTER	HORLOGE ↵:ENTRER	ﾄｹｲｾｯﾃｲ ↵:ｶｸﾃｲ
Timer set	TIMER SET ↵:ENTER	Zeitschaltuhr ↵:einstellen	TEMPORIZA - DOR ↵:CONFIG	Таймер: уст. ↵: ввод	TIMER ↵:ENTER	定时器 ↵:ENTER	PROG HORAIRE ↵:ENTRER	ﾀｲﾏｰ-ｾｯﾃｲ ↵:ｶｸﾃｲ
Timer monitor	TIMER MONITOR	Uhrzeit Anzeige	VISUALIZAR TEMPORIZAD.	Просмотр таймера	VISUALIZ TIMER	定时器状态	AFFICHAGE PROG HORAIRE	ﾀｲﾏｰ-ﾓﾆﾀｰ-
Weekly timer	WEEKLY TIMER	Wochenzeit schalt Uhr	TEMPORIZA - DOR SEMANAL	Недельный таймер	TIMER SETTIMANALE	每周定时器	PROG HEBDO MADAIRE	ﾀｲﾏｰ-週間
Timer mode off	TIMER MODE OFF	Zeitschaltuhr AUS	TEMPORIZA - DOR APAGADO	Таймер выкл.	TIMER OFF	定时器无效	PROG HORAIRE INACTIF	ﾀｲﾏｰ-無効
Auto off timer	AUTO OFF TIMER	Auto Zeit funktion aus	APAGADO AUTOMÁTICO	Автоотключ. по таймеру	AUTO OFF TIMER	解除定时	PROG HORAIRE ARRET AUTO	ﾀｲﾏｰ-ｹﾞﾝｼｭﾙ ﾎﾞｳｼ
Simple timer	SIMPLE TIMER	Einfache Zeitfunktion	TEMPORIZA - DOR SIMPLE	Простой таймер	TIMER SEMPLIFICATO	简易定时器	PROG HORAIRE SIMPLIFIE	ﾀｲﾏｰ-ｶﾝｲ
Contact number setting of error situation	CALL	←	←	←	←	←	←	←
Display change	DISP MODE SETTING	Anzeige Betriebsart	MOSTRAR MODO	Настройка инд. режима	IMPOSTAZIONE MODO DISPLAY	转换表示	AFFICHAGE SOUS MENU	表示切替
Temperature display °C/°F setting	TEMP MODE °C/°F	Wechsel °C/°F	TEMP.GRADOS °C/°F	Един.темпер. °C/°F	TEMPERATURA °C/°F	温度°C/°F	TEMPERATURE °C/°F	温度°C/°F
Room air temperature display setting	ROOM TEMP DISP SELECT	Raum temp gewahlt	MOSTRAR TEMP.	Показывать темп.в комн.	TEMPERATURA AMBIENTE	吸入温度	TEMPERATURE AMBIANTE	ｽｲｺﾐｵﾝﾄﾞ ﾋｮｳｼﾞ
Automatic cooling/heating display setting	AUTO MODE DISP C/H	Auto Betrieb C/H	MOSTRAR F/C EN AUTO	Инд. T/X в режиме АВТО	AUTO C/H	自动表示	AFFICHAGE AUTO F/C	自動ﾚｲﾀﾞﾝﾋｮｳｼﾞ

9. Emergency Operation for Wireless Remote-controller



When the remote controller cannot be used

When the batteries of the remote controller run out or the remote controller malfunctions, the emergency operation can be done using the emergency buttons on the grille.

ⒶDEFROST/STAND BY lamp

ⒷOperation lamp

ⒸEmergency operation switch (heating)

ⒹEmergency operation switch (cooling)

ⒺReceiver

Starting operation

- To operate the cooling mode, press the ☼ button Ⓓ.
- To operate the heating mode, press the ☼ button Ⓒ.

Note:

- **Details of emergency mode are as shown below.**

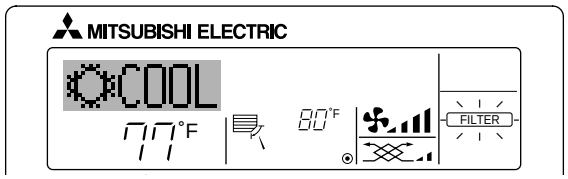
Details of EMERGENCY MODE are as shown below.

Operation mode	COOL	HEAT
Set temperature	24°C, 75°F	24°C, 75°F
Fan speed	High	High
Airflow direction	Horizontal	Downward 4

Stopping operation

- To stop operation, press the ☼ button Ⓓ or the ☼ button Ⓒ.

10. Care and Cleaning



■ Indicates that the filter needs cleaning.
Ask authorized people to clean the filter.

■ When resetting "FILTER" display
When the [FILTER] button is pressed two times successively after cleaning the filter, the display goes off and is reset.

Note:

- **When two or more different types of indoor unit are controlled, the cleaning period differs with the type of filter. When the master unit cleaning period arrives, "FILTER" is displayed. When the filter display goes off, the cumulative time is reset.**
- **"FILTER" indicates the cleaning period when the air conditioner was used under general indoor air conditions by criteria time. Since the degree of dirtiness depends on the environmental conditions, clean the filter accordingly.**
- **The filter cleaning period cumulative time differs with the model.**
- **This indication is not available for wireless remote controller.**

11. Trouble Shooting

Having trouble?	Here is the solution. (Unit is operating normally.)
Air conditioner does not heat or cool well.	■ Clean the filter. (Airflow is reduced when the filter is dirty or clogged.) ■ Check the temperature adjustment and adjust the set temperature. ■ Make sure that there is plenty of space around the outdoor unit. Is the indoor unit air intake or outlet blocked? ■ Has a door or window been left open?
When heating operation starts, warm air does not blow from the indoor unit soon.	■ Warm air does not blow until the indoor unit has sufficiently warmed up.
During heating mode, the air conditioner stops before the set room temperature is reached.	■ When the outdoor temperature is low and the humidity is high, frost may form on the outdoor unit. If this occurs, the outdoor unit performs a defrosting operation. Normal operation should begin after approximately 10 minutes.
Airflow direction changes during operation or airflow direction cannot be set.	■ During cooling mode, the vanes automatically move to the horizontal (down) position after 1 hour when the down (horizontal) airflow direction is selected. This is to prevent water from forming and dripping from the vanes. ■ During heating mode, the vanes automatically move to the horizontal airflow direction when the airflow temperature is low or during defrosting mode.
When the airflow direction is changed, the vanes always move up and down past the set position before finally stopping at the position.	■ When the airflow direction is changed, the vanes move to the set position after detecting the base position.
A flowing water sound or occasional hissing sound is heard.	■ These sounds can be heard when refrigerant is flowing in the air conditioner or when the refrigerant flow is changing.
A cracking or creaking sound is heard.	■ These sounds can be heard when parts rub against each due to expansion and contraction from temperature changes.
The room has an unpleasant odor.	■ The indoor unit draws in air that contains gases produced from the walls, carpeting, and furniture as well as odors trapped in clothing, and then blows this air back into the room.
A white mist or vapor is emitted from the indoor unit.	■ If the indoor temperature and the humidity are high, this condition may occur when operation starts. ■ During defrosting mode, cool airflow may blow down and appear like a mist.
Water or vapor is emitted from the outdoor unit.	■ During cooling mode, water may form and drip from the cool pipes and joints. ■ During heating mode, water may form and drip from the heat exchanger. ■ During defrosting mode, water on the heat exchanger evaporates and water vapor may be emitted.
The operation indicator does not appear in the remote controller display.	■ Turn on the power switch. "◉" will appear in the remote controller display.

11. Trouble Shooting

<table>
<tr><th>Having trouble?</th><th>Here is the solution. (Unit is operating normally.)</th></tr>
<tr><td>“” appears in the remote controller display.</td><td>■ During central control, “” appears in the remote controller display and air conditioner operation cannot be started or stopped using the remote controller.</td></tr>
<tr><td>When restarting the air conditioner soon after stopping it, it does not operate even though the ON/OFF button is pressed.</td><td>■ Wait approximately three minutes.
(Operation has stopped to protect the air conditioner.)</td></tr>
<tr><td>Air conditioner operates without the ON/OFF button being pressed.</td><td>■ Is the on timer set?
Press the ON/OFF button to stop operation.
■ Is the air conditioner connected to a central remote controller?
Consult the concerned people who control the air conditioner.
■ Does “” appear in the remote controller display?
Consult the concerned people who control the air conditioner.
■ Has the auto recovery feature from power failures been set?
Press the ON/OFF button to stop operation.</td></tr>
<tr><td>Air conditioner stops without the ON/OFF button being pressed.</td><td>■ Is the off timer set?
Press the ON/OFF button to restart operation.
■ Is the air conditioner connected to a central remote controller?
Consult the concerned people who control the air conditioner.
■ Does “” appear in the remote controller display?
Consult the concerned people who control the air conditioner.</td></tr>
<tr><td>Remote controller timer operation cannot be set.</td><td>■ Are timer settings invalid?
If the timer can be set, (WEEKLY), (SIMPLE), or (AUTO OFF) appears in the remote controller display.</td></tr>
<tr><td>“PLEASE WAIT” appears in the remote controller display.</td><td>■ The initial settings are being performed. Wait approximately 3 minutes.</td></tr>
<tr><td>An error code appears in the remote controller display.</td><td>■ The protection devices have operated to protect the air conditioner.
■ Do not attempt to repair this equipment by yourself.
Turn off the power switch immediately and consult your dealer. Be sure to provide the dealer with the model name and information that appeared in the remote controller display.</td></tr>
<tr><td>Draining water or motor rotation sound is heard.</td><td>■ When cooling operation stops, the drain pump operates and then stops.
Wait approximately 3 minutes.</td></tr>
<tr><td>Noise is louder than specifications.</td><td>■ The indoor operation sound level is affected by the acoustics of the particular room as shown in the following table and will be higher than the noise specification, which was measured in an echo-free room.
<table>
<tr><td></td><td>High sound-absorbing rooms</td><td>Normal rooms</td><td>Low sound-absorbing rooms</td></tr>
<tr><td>Location examples</td><td>Broadcasting studio, music room, etc.</td><td>Reception room, hotel lobby, etc.</td><td>Office, hotel room</td></tr>
<tr><td>Noise levels</td><td>3 to 7 dB</td><td>6 to 10 dB</td><td>9 to 13 dB</td></tr>
</table></td></tr>
<tr><td>Nothing appears in the wireless remote controller display, the display is faint, or signals are not received by the indoor unit unless the remote controller is close.</td><td>■ The batteries are low.
Replace the batteries and press the Reset button.
■ If nothing appears even after the batteries are replaced, make sure that the batteries are installed in the correct directions (+, –).</td></tr>
<tr><td>The operation lamp near the receiver for the wireless remote controller on the indoor unit is flashing.</td><td>■ The self diagnosis function has operated to protect the air conditioner.
■ Do not attempt to repair this equipment by yourself.
Turn off the power switch immediately and consult your dealer. Be sure to provide the dealer with the model name.</td></tr>
</table>

12. Specifications

Model		PLA-A12AA	PLA-A18AA	PLA-A24AA	PLA-A30AA	PLA-A36AA	PLA-A42AA
Power source (Phase, Voltage <V>, Frequency <Hz>)		Single 208/230, 60					
Fan motor	<FLA>	0.79	0.79	0.79		1.25	
MCA	<A>	1	1	1	1	2	2
MOCP	<A>	15	15	15	15	15	15
Dimension (Height)	<inch>	10-3/16(1-3/16)				11-3/4(1-3/16)	
Dimension (Width)	<inch>	33-1/16(37-3/8)					
Dimension (Depth)	<inch>	33-1/16(37-3/8)					
Airflow (Low-Middle2-Middle1-High)	DRY <CFM>	390-420-460-490	530-570-640-710			710-810-920-990	
	WET <CFM>	350-380-420-450	490-530-600-670			670-770-880-950	
Noise level (Low-Middle2-Middle1-High)	<dB>	27-28-29-31	28-30-32-34			33-36-39-41	
Net weight	<lbs>	49(11)	53(11)			66(11)	

*1 The figure in () indicates GRILL's.

Model		PKA-A12GA	PKA-A18GA	PKA-A24FA	PKA-A30FA	PKA-A36FA
Power source (Phase, Voltage <V>, Frequency <Hz>)		Single 208/230, 60				
Fan motor	<FLA>	0.33		0.43		0.52
MCA	<A>	1	1	1	1	1
MOCP	<A>	15	15	15	15	15
Dimension (Height)	<inch>	13-3/8		13-3/8		
Dimension (Width)	<inch>	39		55-1/8		66-1/8
Dimension (Depth)	<inch>	9-1/4		9-1/4		
Airflow (Low-Middle2-Middle1-High)	DRY <CFM>	320-350-390-425		530-705		780-990
	WET <CFM>	290-315-350-380		480-635		700-890
Noise level (Low-Middle2-Middle1-High or Low-High)	<dB>	36-38-41-43		39-45		46-49
Net weight	<lbs>	35		53		62

Model		PKA-A12GAL	PKA-A18GAL	PKA-A24FAL	PKA-A30FAL	PKA-A36FAL
Power source (Phase, Voltage <V>, Frequency <Hz>)		Single 208/230, 60				
Fan motor	<FLA>	0.33		0.43		0.52
MCA	<A>	1	1	1	1	1
MOCP	<A>	15	15	15	15	15
Dimension (Height)	<inch>	13-3/8		13-3/8		
Dimension (Width)	<inch>	39		55-1/8		66-1/8
Dimension (Depth)	<inch>	9-1/4		9-1/4		
Airflow (Low-Middle2-Middle1-High)	DRY <CFM>	320-350-390-425		530-705		780-990
	WET <CFM>	290-315-350-380		480-635		700-890
Noise level (Low-Middle2-Middle1-High or Low-High)	<dB>	36-38-41-43		39-45		46-49
Net weight	<lbs>	35		53		62

Model		PCA-A24GA	PCA-A30GA	PCA-A36GA	PCA-A42GA
Power source (Phase, Voltage <V>, Frequency <Hz>)		Single 208/230, 60			
Fan motor	<FLA>	0.53		0.69	
MCA	<A>	1	1	1	1
MOCP	<A>	15	15	15	15
Dimension (Height)	<inch>	8-1/4		10-5/8	
Dimension (Width)	<inch>	51-9/16			
Dimension (Depth)	<inch>	26-3/4			
Airflow (Low-Middle2-Middle1-High)	DRY <CFM>	495-530-565-635		705-740-810-880	
	WET <CFM>	445-480-510-570		635-670-730-790	
Noise level (Low-Middle2-Middle1-High)	<dB>	37-39-41-43		40-41-43-45	
Net weight	<lbs>	75		82	

Contenido

1. Medidas de Seguridad

- **Antes de instalar la unidad, asegúrese de haber leído el capítulo de "Medidas de seguridad".**
- **Las "Medidas de seguridad" señalan aspectos muy importantes sobre seguridad. Es importante que se cumplan todos.**
- **Antes de conectar el sistema, informe al servicio de suministro o pídale permiso para efectuar la conexión.**

Símbolos utilizados en el texto

⚠ Atención:
Describe precauciones que deben tenerse en cuenta para evitar el riesgo de lesiones o muerte del usuario.

⚠ Cuidado:
Describe las precauciones que se deben tener para evitar daños en la unidad.

Símbolos utilizados en las ilustraciones

⏚ : Indica una pieza que debe estar conectada a tierra.

⚠ Atención:

- **La unidad no debe ser instalada por el usuario. Pida a su distribuidor o a una empresa debidamente autorizada que se lo instale. La incorrecta instalación de la unidad puede dar lugar a goteo de agua, descarga eléctrica o fuego.**
- **No se suba encima ni coloque objetos sobre la unidad.**
- **No vierta agua sobre la unidad ni la toque con las manos húmedas. Puede producirse una descarga eléctrica.**
- **No rocíe gases combustibles en las proximidades de la unidad. Puede haber riesgo de incendio.**
- **No coloque calentadores de gas o cualquier otro aparato de llama abierta expuestos a la corriente de aire descargada por la unidad. Puede dar lugar a una combustión incompleta.**
- **No extraiga el panel frontal del ventilador de la unidad exterior mientras esté en funcionamiento.**
- **Cuando note ruidos o vibraciones que no sean normales, pare la unidad, desconecte la fuente de alimentación y póngase en contacto con su proveedor.**
- **No inserte nunca dedos, palos, etc. en las tomas o salidas de aire.**
- **Si detecta olores raros pare la unidad, desconecte el interruptor de red y consulte con su distribuidor. De lo contrario puede haber una rotura, una descarga eléctrica o fuego.**
- **Este aparato de aire acondicionado NO debe ser utilizado por niños ni por personas inválidas sin el control de una persona adulta.**
- **Los niños pequeños deben estar vigilados por personas adultas para impedir que jueguen con el equipo de aire acondicionado.**
- **Si se producen fugas de gas refrigerante, pare la unidad, ventile bien la habitación y avise a su proveedor.**

⚠ Cuidado:

- **No utilice objetos puntiagudos para apretar los botones ya que podría dañarse el controlador remoto.**
- **No bloquee ni cubra nunca las tomas y salidas de las unidades interior y exterior.**

Eliminación de la unidad

Cuando deba eliminar la unidad, consulte con su distribuidor.

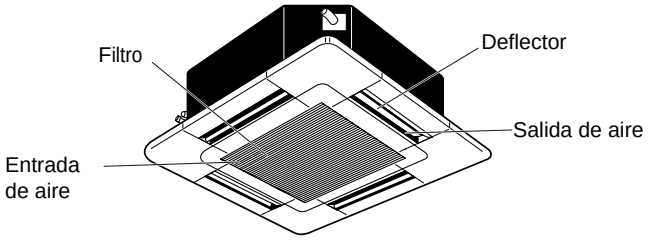
2. Nombres de las piezas

■ Unidad interior

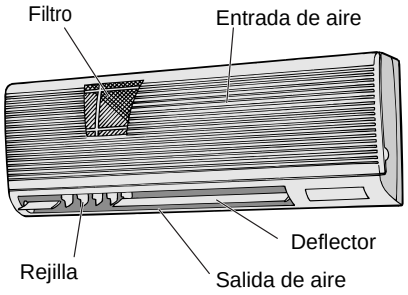
	PLA-A·AA	PKA-A·GA PKA-A·GAL	PKA-A·FA PKA-A·FAL	PCA-A·GA
Pasos del ventilador	4 pasos	4 pasos	2 pasos	4 pasos
Deflector	Automático oscilante	Automático oscilante	Automático oscilante	Automático oscilante
Rejilla	–	Manual	Manual	Manual
Filtro	Larga duración	Normal	Normal	Larga duración
Indicación de limpieza de filtro	2,500 horas	100 horas	100 horas	2,500 horas

2. Nombres de las piezas

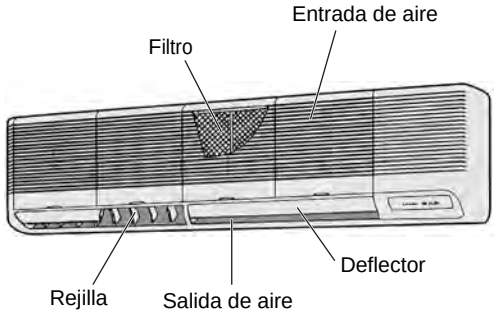
■ **PLA-A·AA**
Modelo empotrado en techo de 4 direcciones



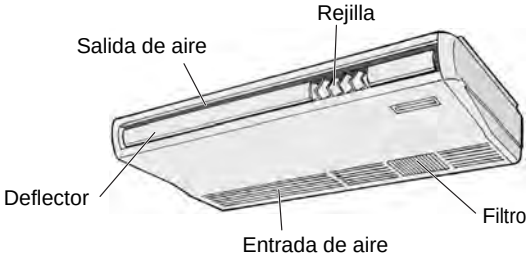
■ **PKA-A·GA/PKA-A·GAL**
Modelo montado en pared



■ **PKA-A·FA/PKA-A·FAL**
Modelo montado en pared



■ **PCA-A·GA**
Modelo montado en techo



2. Nombres de las piezas

■ **Para controlador remoto cableado**

Sección de pantalla

Para esta explicación, se muestran iluminadas todas las partes de la pantalla. Durante el funcionamiento real, sólo estarán iluminados los elementos relevantes.

Día de la semana
Muestra el día de la semana actual.

Pantalla Time/Timer
Muestra la hora actual, a menos que se haya configurado el temporizador simple o de apagado automático, en cuyo caso, muestra el tiempo restante.

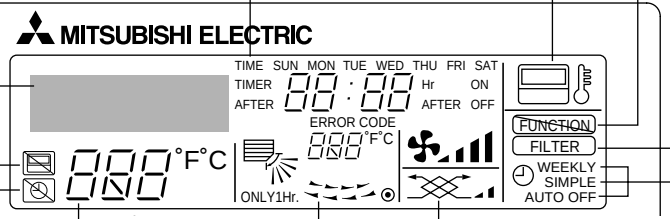
Indicador "Sensor"
Aparece cuando se utiliza el sensor del mando a distancia.

Indicador "Locked"
Indica que se han bloqueado los botones del mando a distancia.

Indicador "Clean The Filter"
Se enciende cuando debe limpiarse el filtro.

Indicadores del temporizador
El indicador se enciende si se ha configurado el temporizador correspondiente.

Identifica el funcionamiento actual.
Muestra el modo de funcionamiento, etc.
* Admite visualización en múltiples idiomas.



Indicador "Centrally Controlled"
Indica que el mando principal ha desactivado el funcionamiento del mando a distancia.

Indicador "Timer Is Off"
Indica que el temporizador está desactivado.

Configuración de temperatura
Muestra la temperatura objetivo.

Indicador de velocidad del ventilador
Muestra la velocidad del ventilador seleccionada.

Indicador de ventilación
Aparece cuando la unidad funciona en modo Ventilación.

Indicador de dirección de aire Arriba/Abajo
El indicador ＼ muestra la dirección de circulación del aire de salida.

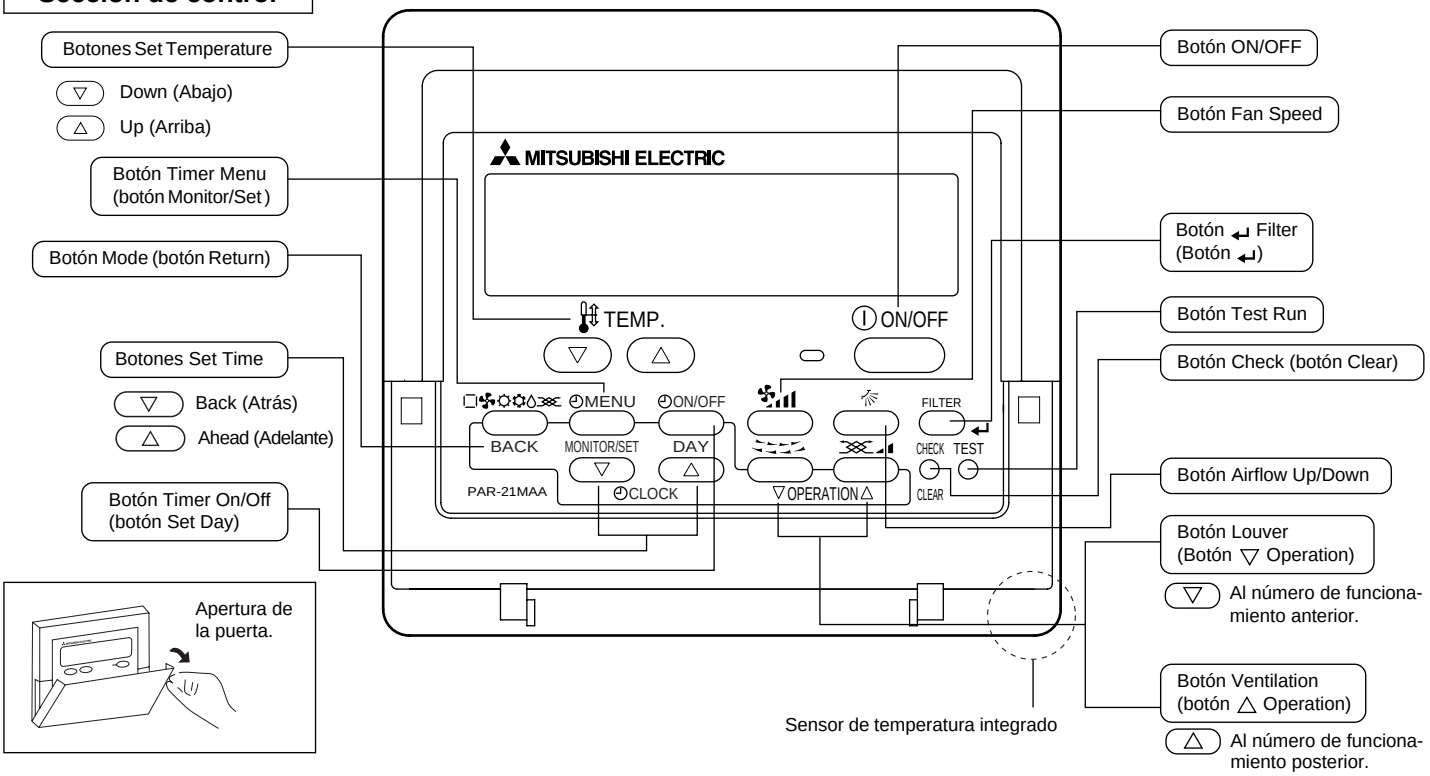
Indicador "One Hour Only"
Se muestra si la circulación del aire se ha fijado en débil y hacia abajo durante el modo COOL o DRY. (El funcionamiento varía según el modelo).
El indicador se apaga después de una hora, momento en que cambia también la dirección de circulación del aire.

Pantalla de temperatura ambiente
Muestra la temperatura ambiente. El rango de temperatura ambiente que muestra la pantalla va de 8 a 39 °C. La pantalla parpadea si la temperatura no llega a 8 °C o supera los 39 °C.

Pantalla de rejilla
Indica la acción de la rejilla basculante. No aparece si la rejilla se encuentra fija.

◉ (Indicador Power On)
Indica que está encendido.

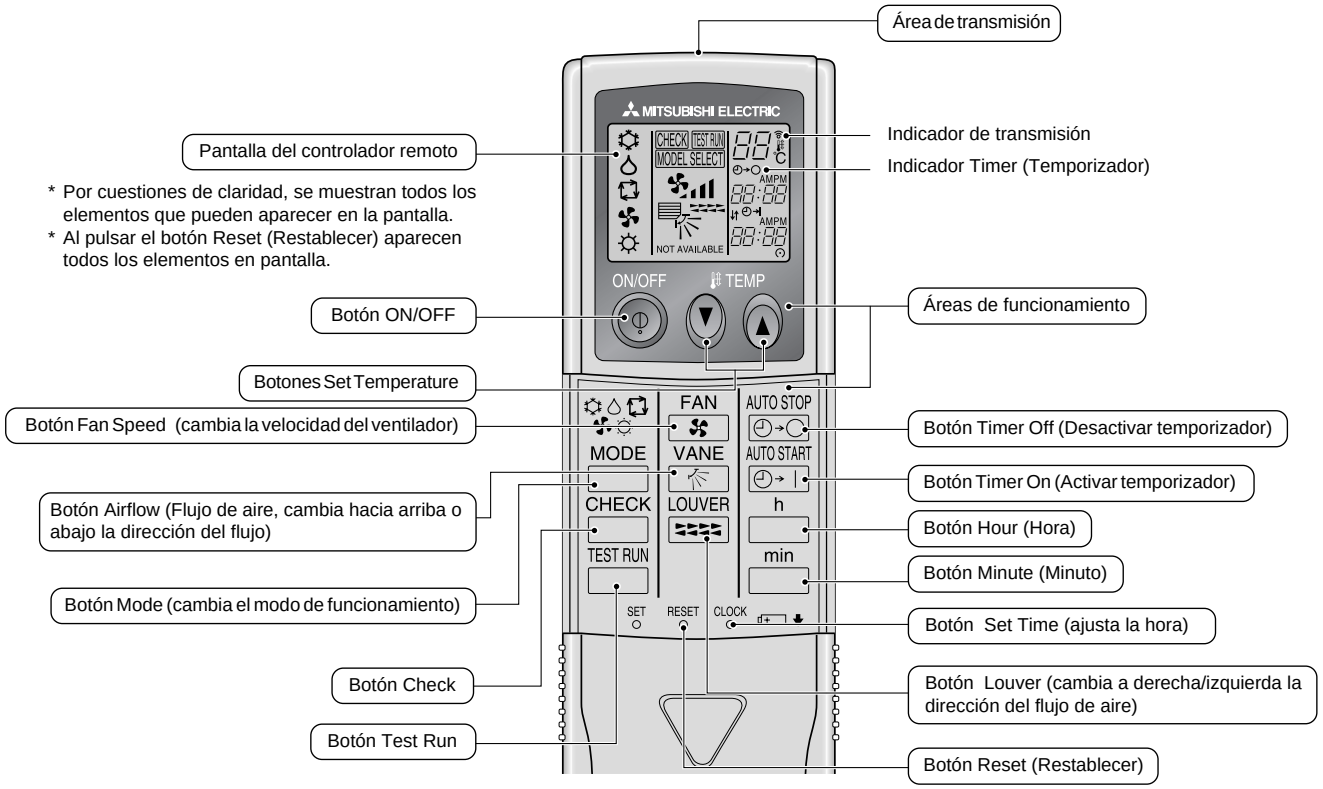
Sección de control



Nota:
- Mensaje "PLEASE WAIT" (POR FAVOR, ESPERE)
  Este mensaje aparece durante aprox. 3 minutos cuando la unidad interior recibe alimentación o cuando la unidad se está recuperando de una caída de tensión.
- Mensaje "NOT AVAILABLE" (NO DISPONIBLE)
  Este mensaje aparece si se pulsa un botón para activar una función que la unidad interior no presenta.
  Si está utilizando un controlador remoto para controlar simultáneamente distintos modelos de unidades interiores, este mensaje no aparecerá si alguna de las unidades interiores dispone de la función.

2. Nombres de las piezas

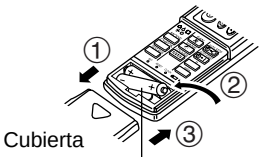
■ **Para controlador remoto inalámbrico**



■ Cuando utilice el controlador remoto inalámbrico, apunte hacia el receptor de la unidad interior.
■ Si el controlador remoto se utiliza unos dos minutos después de encender la unidad interior, esta puede pitar dos veces, ya que estará realizando la comprobación automática inicial.
■ La unidad interior pitará para confirmar que ha recibido la señal transmitida desde el controlador remoto. La unidad interior puede recibir señales emitidas a un máximo de 7 metros en línea recta en un rango de 45° a derecha e izquierda de la unidad. Sin embargo, ciertos sistemas de iluminación, con fluorescentes o luces fuertes, pueden afectar a la capacidad de recepción de señal de la unidad interior.
■ Si la luz de funcionamiento situada cerca del receptor de la unidad interior parpadea, será necesario inspeccionar la unidad. Consulte a su representante del servicio técnico.
■ Trate el controlador remoto con cuidado. Procure que no se le caiga ni sufra golpes. Además, no lo moje ni lo deje en un lugar con un alto grado de humedad.
■ Para impedir que el controlador remoto se pierda, instale el soporte incluido con el controlador remoto en una pared y asegúrese de colocar el mando en su soporte tras su uso.

Instalación/sustitución de pilas

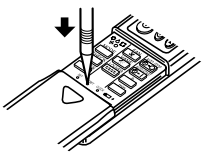
1. Retire la cubierta superior, inserte dos pilas AAA y vuelva a colocar la cubierta.



Cubierta superior

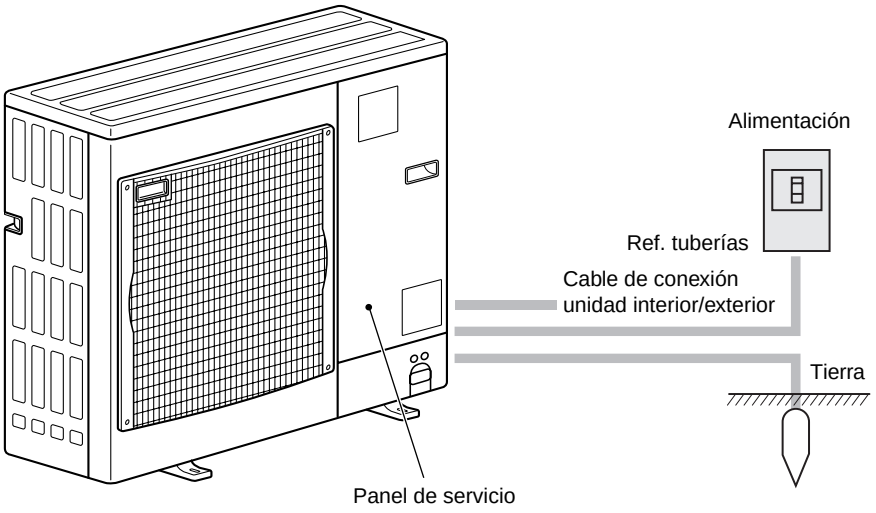
Dos pilas AAA
Inserte las pilas comenzando por el polo negativo (–). Al insertar las pilas, respete la polaridad (+, –).

2. Pulse el botón Reset (Restablecer).

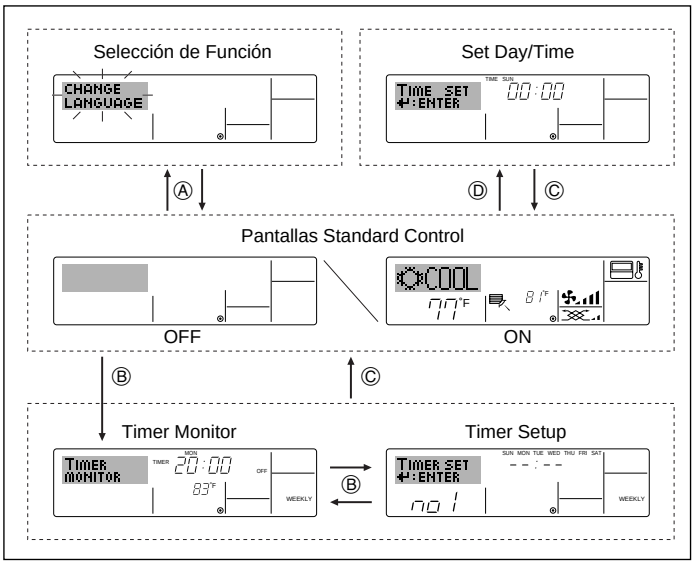


Pulse el botón Reset (Restablecer) con un objeto terminado en punta.

■ **Unidad exterior**



3. Configuración de la pantalla



<Tipos de pantallas>

El ajuste de idioma de la pantalla se puede cambiar a español utilizando la selección de función del controlador remoto. Consulte la sección 8, punto [4]-1 para cambiar el ajuste de idioma.

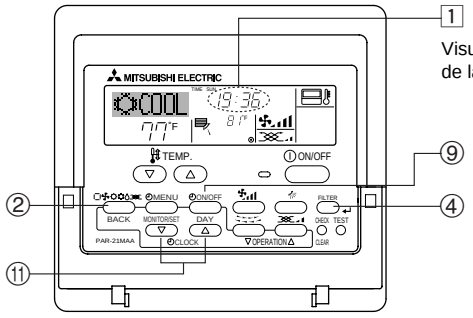
El ajuste inicial es inglés.

- Selección de Función: configure las funciones y rangos disponibles para el mando a distancia (funciones de temporizador, restricciones de funcionamiento, etc.).
- Set Day/Time: configure el día de la semana u hora actual.
- Pantallas Standard Control: visualice y configure el estado de funcionamiento del sistema de acondicionamiento de aire.
- Timer Monitor: visualice el temporizador configurado actualmente (semanal, temporizador simple o apagado automático).
- Timer Setup: configure el funcionamiento de cualquiera de los temporizadores (semanal, simple o apagado automático).

<Cómo cambiar la pantalla>

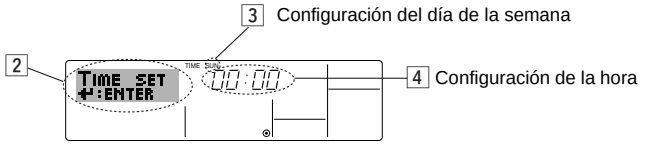
Para dirigirse a Ⓐ : mantenga pulsado el botón Mode y el botón Timer On/Off durante 2 segundos.
Para dirigirse a Ⓑ : presione el botón Timer Menu.
Para dirigirse a Ⓒ : presione el botón Mode (Return).
Para dirigirse a Ⓓ : presione cualquiera de los botones Set Time (▽ o △).

4. Configuración de día de la semana y hora



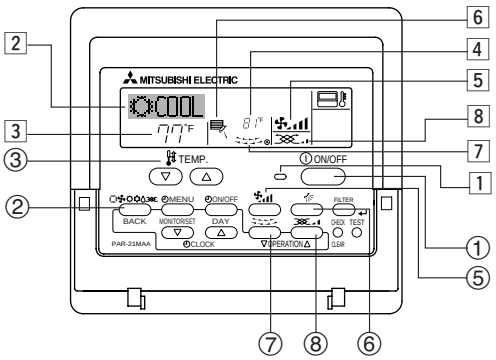
Nota:

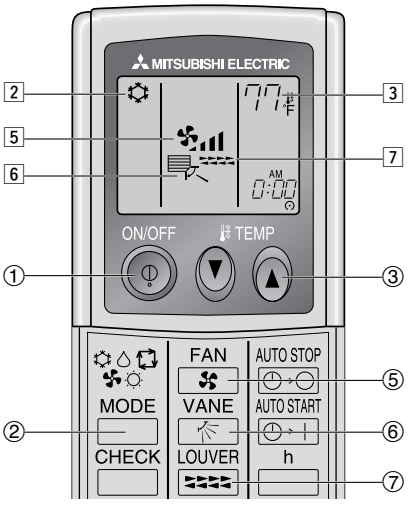
El día y la hora no aparecerán si se ha desactivado la utilización del reloj en la Selección de Función.



1. Pulse ▽ o △ del botón Set Time ⑪ para que muestre el indicador 2.
2. Pulse el botón Timer On/Off (Set Day) ⑨ para fijar el día.
   * Cada pulsación avanza el día que se muestra en 3: Sun → Mon → ... → Fri → Sat.
3. Pulse el botón Set Time apropiado ⑪ según sea necesario para configurar la hora.
   * Mientras mantiene presionado el botón, la hora (en 4) avanzará primero en intervalos de minutos, luego en intervalos de diez minutos y después en intervalos de una hora.
4. Después de realizar las configuraciones apropiadas en los Pasos 2 y 3, pulse el botón ↵ Filter ④ para fijar los valores.

5. Manejo





5.1. Encendido y apagado

<Para poner en marcha>

■ Pulse el botón ON/OFF ①.

- Se encienden la lámpara de encendido 1 y la pantalla.

Nota:

● **Cuando se reinicia la unidad, las configuraciones iniciales son las siguientes.**

	Configuraciones del Mando a distancia		
Modo	Último valor configurado		
Configuración de la temperatura	Último valor configurado		
Velocidad del ventilador	Último valor configurado		
Circulación del aire hacia Arriba/Abajo	Modo	COOL o DRY	Salida horiz. *
		HEAT	Último valor configurado
		FAN	Salida horiz. *

* Se ajustará con el último valor configurado para el controlador remoto con cable.

5. Manejo

<Para detener el funcionamiento>

■ Pulse de nuevo el botón ON/OFF ①.
- Se oscurecen la lámpara de encendido [1] y la pantalla.

Nota:
Aunque pulse una vez más el botón de encendido ON/OFF inmediatamente después de apagar el aparato, el acondicionador de aire no se pondrá en marcha hasta pasados tres minutos. Esto tiene como fin evitar daños en los componentes internos.

5.2. Selección de modo

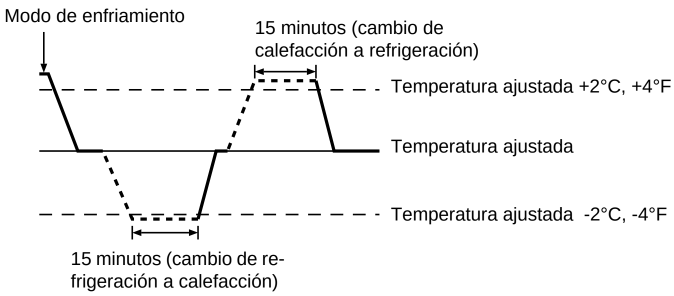
■ Pulse el botón de modos de funcionamiento ( ) ② y seleccione el modo de funcionamiento [2].

- Modo de enfriamiento
- Modo secado
- Modo de ventilador
- Modo de calefacción
- Modo automático (enfriamiento/calefacción)
- Modo de ventilación
  Sólo indicado si se cumple lo siguiente
  Uso de controlador remoto cableado
  Combinación LOSSNAY conectada

Funcionamiento automático

■ De acuerdo con la temperatura ajustada, el funcionamiento de refrigeración comenzará si la temperatura de la sala es demasiado alta. El modo de calefacción comenzará si la temperatura de la sala es demasiado baja.

■ Durante el funcionamiento automático, si la temperatura de la sala cambia y permanece 2 °C, 4 °F o más por encima de la temperatura ajustada durante 15 minutos, el acondicionador de aire cambiará a modo de refrigeración. Asimismo, si la temperatura permanece 2 °C, 4 °F o más por debajo de la temperatura ajustada durante 15 minutos, el acondicionador de aire cambiará a modo de calefacción.



■ Como la temperatura ambiente se ajusta automáticamente para mantener una temperatura efectiva fija, el modo de refrigeración se activa un par de grados por encima de la temperatura ajustada (y el modo de calefacción, un par de grados por debajo) una vez alcanzada dicha temperatura (modo automático de ahorro de energía).

5.3. Ajuste de la temperatura

▶ **Para disminuir la temperatura de la habitación:**
Pulse el botón ③ para fijar la temperatura deseada.
En el visor aparecerá la temperatura seleccionada [3].

▶ **Para aumentar la temperatura de la habitación:**
Pulse el botón ③ para fijar la temperatura deseada.
En el visor aparecerá la temperatura seleccionada [3].

- Las gamas de ajuste de temperaturas disponibles son las siguientes:

Enfriamiento y secado:	19 - 30 °C, 67 - 87 °F
Calefacción:	17 - 28 °C, 63 - 83 °F
Automático:	19 - 28 °C, 67 - 83 °F

- La pantalla parpadea 8 °C - 39 °C, 46 °F - 102 °F para informar si la temperatura de la habitación es inferior o superior a la temperatura que se visualiza.

5.4. Ajuste de la velocidad del ventilador

■ Pulse el botón Fan Speed ⑤ tantas veces como sea necesario con el sistema en funcionamiento.
- Cada pulsación cambia la potencia. La velocidad seleccionada actualmente se muestra en [5].
- La secuencia de cambio y las configuraciones disponibles son las siguientes.

FAN SPEED	Pantalla
Modelo de 4 velocidades	Velocidad 1 → Velocidad 2 → Velocidad 3 → Velocidad 4
Modelo de 2 velocidades	→

Nota:
- **El número de velocidades del ventilador disponibles depende del tipo de unidad conectada. Recuerde, además, que algunas unidades no ofrecen ajuste "Automático".**
- **En los siguientes casos, la velocidad real del ventilador generada por la unidad diferirá de la velocidad mostrada en la pantalla del mando a distancia.**
  1. **Mientras la pantalla muestra "STAND BY" o "DEFROST".**
  2. **Cuando la temperatura del intercambiador de calor es baja en modo de calefacción (por ejemplo, inmediatamente después de que se active el modo de calefacción).**
  3. **En modo HEAT, cuando la temperatura ambiente de la habitación es superior al valor de configuración de la temperatura.**
  4. **Cuando la unidad esté en modo DRY.**

5.5. Ajuste de la dirección del flujo de aire

<Para cambiar la dirección de circulación del aire hacia Arriba/Abajo>

■ Con la unidad en funcionamiento, pulse el botón Airflow Up/Down ⑥ tantas veces como sea necesario.
- Cada pulsación cambia la dirección. La dirección actual se muestra en [6].
- La secuencia de cambio y las configuraciones disponibles son las siguientes.

Pantalla	Horiz. → 1 → 2 → 3 → Oscilación

* Recuerde que durante el funcionamiento oscilante (Swing), la indicación direccional en la pantalla no cambia en sincronización con los álabes direccionales en la unidad.
* Algunos modelos no admiten configuraciones direccionales.

Nota:
- **Las direcciones disponibles dependen del tipo de unidad conectada. Recuerde, además, que algunas unidades no ofrecen una configuración "Auto".**
- **En los siguientes casos, la dirección real del aire diferirá de la dirección indicada en la pantalla del mando a distancia.**
  1. **Mientras la pantalla muestra "STAND BY" o "DEFROST".**
  2. **Inmediatamente después de iniciar el modo calentador (durante la espera para la realización del cambio).**
  3. **En modo calentador, cuando la temperatura ambiente de la sala sea superior a la configuración de la temperatura.**

5. Manejo

<Para cambiar la dirección del aire Derecha/Izquierda>

■ Pulse el botón Louver ⑦ según sea necesario.
- Aparece la imagen de la rejilla 7.
  Cada pulsación del botón, cambia la configuración según se muestra a continuación.

Sin indicador (Stop)

Durante el funcionamiento basculante, la visualización de la flecha se mueve a izquierda y derecha.

5.6. Ventilación

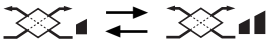
▶ Para combinación LOSSNAY

5.6.1. Para controlador remoto cableado

● Para hacer funcionar el renovador de aire junto con la unidad interior:
■ Pulse el botón ON/OFF ①.
- El indicador Vent aparece en la pantalla (en 8). Ahora el renovador de aire funcionará automáticamente cuando funcione la unidad interior.

● Para hacer funcionar el renovador de aire de modo independiente:
■ Pulse el botón Mode ② hasta que aparezca en la pantalla . Esto hará que el renovador de aire comience a funcionar.

● Para cambiar la potencia del renovador de aire:
■ Pulse el botón Ventilation ⑧ según sea necesario.
- Cada pulsación cambia la configuración según se muestra a continuación.



5.6.2. Para controlador remoto inalámbrico

● El ventilador se activará automáticamente al encenderse la unidad interior.
● No aparecerá ninguna indicación en el controlador remoto inalámbrico.

6. Temporizador

6.1. Para controlador remoto cableado

Puede utilizar la Selección de Función para seleccionar cuál de los tres tipos de temporizador utilizar: ① temporizador semanal, ② temporizador simple o ③ temporizador automático.

6.1.1. Temporizador semanal

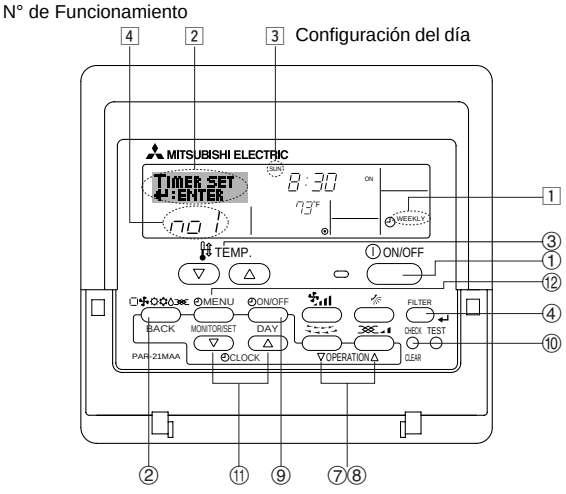
■ El temporizador semanal puede utilizarse para configurar hasta ocho funciones para cada día de la semana.
- Cada función puede consistir en cualquiera de las siguientes: hora de encendido y apagado junto a una configuración de la temperatura, sólo hora de encendido y apagado o sólo configuración de la temperatura.
- Cuando la hora actual alcanza la hora configurada en este temporizador, el acondicionador de aire realiza la acción configurada por el temporizador.

■ El tiempo necesario para la configuración de la hora para este temporizador es de 1 minuto.

Nota:

***1. El temporizador semanal, el temporizador simple y el temporizador automático no pueden utilizarse al mismo tiempo.**

***2. El temporizador semanal no funcionará si se da alguna de las siguientes condiciones.**
La función de temporizador está desactivada; el sistema se encuentra en un estado anómalo; hay una sesión de prueba en curso; se está llevando a cabo una autoprueba o una prueba del mando a distancia; el usuario está configurando una función; el usuario está configurando el temporizador; el usuario está configurando el día actual de la semana o la hora; el sistema se encuentra bajo el control central. En concreto, el sistema no llevará a cabo operaciones (encendido o apagado de la unidad, configuración de la temperatura) que estén desactivadas cuando se produzcan estas condiciones.



<Cómo configurar el temporizador semanal>

1. Asegúrese de que se encuentra en la pantalla de control estándar y de que el indicador del temporizador semanal 1 se muestra en la pantalla.
2. Pulse el botón Timer Menu ⑫, de modo que aparezca en la pantalla "Set Up" (en 2). (Recuerde que cada pulsación del botón cambia la pantalla entre "Set Up" y "Monitor").
3. Pulse el botón Timer On/Off (Set Day) ⑨ para configurar el día. Cada pulsación avanza la pantalla 3 a la próxima configuración en la secuencia que se indica a continuación: "Sun Mon Tues Wed Thurs Fri Sat" → "Sun" → … (Domingo Lunes Martes Miércoles Jueves Viernes Sábado → Domingo) → "Fri" → "Sat" → "Sun Mon Tues Wed Thurs Fri Sat"… (Viernes → Sábado → Domingo Lunes Martes Miércoles Jueves Viernes Sábado).
4. Pulse el botón ▽ o △ Operation (⑦ o ⑧) según sea necesario para seleccionar el número de operación apropiado (1 a 8) 4.
   * La información introducida en los Pasos 3 y 4 seleccionará una de las celdas de la matriz ilustrada a continuación.
   (La pantalla del mando a distancia en la izquierda muestra cómo se mostraría la pantalla cuando se configura Operación 1 para el domingo con los valores indicados a continuación).

Matriz de configuración

N° de op.	Sunday	Monday	…	Saturday
No. 1	• 8:30 • ON • 73 °F			
No. 2	• 10:00 • OFF	• 10:00 • OFF	• 10:00 • OFF	• 10:00 • OFF
…				
No. 8				

<Valores de Operación 1 para el domingo>
Iniciar el funcionamiento del acondicionador de aire a las 8:30, con la temperatura fijada en 73 °F.

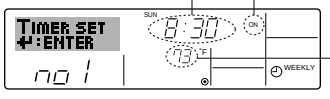
<Valores de Operación 2 para todos los días>
Apagar el acondicionador de aire a las 10:00.

Nota:
Configurando el día a "Sun Mon Tues Wed Thurs Fri Sat", puede configurar la misma operación a la misma hora todos los días.
(Por ejemplo: la Operación 2 arriba mencionada es la misma para todos los días de la semana).

<Configuración del temporizador semanal>

Muestra la configuración de la hora 5

6 Muestra la operación seleccionada (encendido o apagado)
* No aparece si no se ha configurado la operación.



7 Muestra la temperatura fijada
* No aparece si no se ha fijado la temperatura.

5. Pulse el botón Set Time apropiado ⑪ según sea necesario para fijar la hora deseada (en 5).
   * Durante su pulsación, la hora avanza primero en intervalos de un minuto, luego en intervalos de diez minutos y finalmente en intervalos de una hora.
6. Pulse el botón ON/OFF ① para seleccionar la operación deseada (encendido o apagado), en 6.
   * Cada pulsación cambia al siguiente valor en la secuencia que se indica a continuación: sin indicación (sin configuración) → "ON" → "OFF".

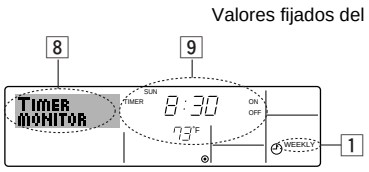
6. Temporizador

7. Pulse el botón Set Temperature apropiado ③ para fijar la temperatura deseada (en 7).
   * Cada pulsación cambia la configuración en la secuencia que se indica a continuación: sin indicación (sin configuración) ⇔ 75 ⇔ 77 ⇔ ... ⇔ 84 ⇔ 86 ⇔ 54 ⇔ ... ⇔ 73 ⇔ sin indicación.
     (Rango disponible: el rango de configuración es de 12 °C, 54 °F a 30 °C, 86 °F. El rango real de control de temperatura, sin embargo, variará según el tipo de unidad conectada).
8. Después de realizar las configuraciones apropiadas en los Pasos 5, 6 y 7, pulse el botón ↵ Filter ④ para guardar los valores.
   Para borrar los valores actualmente configurados para la operación seleccionada, pulse y suelte rápidamente el botón Check (Clear) ⑩ una vez.
   * El valor de la hora mostrada cambiará a "—:—" y desaparecerán tanto los valores de encendido/apagado como el de temperatura.
     (Para borrar todas las configuraciones del temporizador semanal de una vez, mantenga pulsado el botón Check (Clear) ⑩ durante dos o más segundos. La pantalla comenzará a parpadear, indicando que se han borrado todos los valores fijados).

   Nota:
   Sus datos nuevos se cancelarán si pulsa el botón Mode (Return) ② antes de pulsar el botón ↵ Filter ④.
   Si ha configurado dos o más operaciones diferentes para la misma hora exactamente, sólo se realizará la operación con el número más elevado.

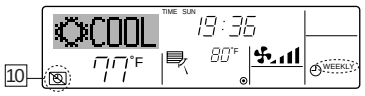
9. Repita los Pasos 3 a 8 según sea necesario para completar tantas celdas disponibles como desee.
10. Pulse el botón Mode (Return) ② para regresar a la pantalla de control estándar y completar el procedimiento de configuración.
11. Para activar el temporizador, pulse el botón Timer On/Off ⑨, de modo que el indicador "Timer Off" desaparezca de la pantalla. **Asegúrese de que ya no se muestre el indicador "Timer Off".**
    * Si no hay valores fijados del temporizador, el indicador "Timer Off" parpadeará en la pantalla.

<Cómo visualizar los valores fijados del temporizador semanal>

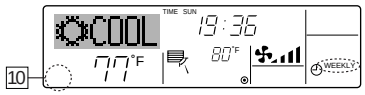


1. Asegúrese de que se muestra en la pantalla el indicador del temporizador semanal (en 1).
2. Pulse el botón Timer Menu ⑫ de modo que se indique en la pantalla "Monitor" (en 8).
3. Pulse el botón Timer On/Off (Set Day) ⑨ según sea necesario para seleccionar el día que desea visualizar.
4. Pulse el botón Operation ▽ o △ (⑦ o ⑧) según sea necesario para cambiar el funcionamiento del temporizador mostrado en la pantalla (en 9).
   * Cada pulsación, avanzará a la próxima operación del temporizador, en el orden de configuración de la hora.
5. Para cerrar el monitor y regresar a la pantalla Standard Control, pulse el botón Mode (Return) de ②.

<Para desactivar el temporizador semanal>
Pulse el botón Timer On/Off ⑨ de modo que aparezca "Timer Off" en 10.



<Para activar el temporizador semanal>
Pulse el botón Timer On/Off ⑨ de modo que el indicador "Timer Off" (en 10) se oscurezca.

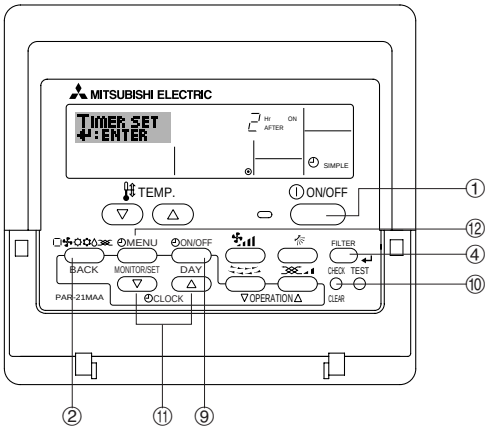


6.1.2. Temporizador simple

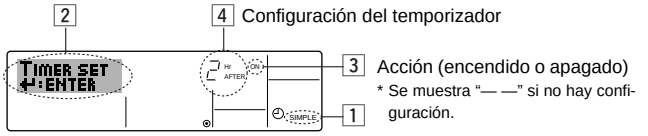
■ Puede configurar el temporizador simple de cualquiera de las tres formas siguientes.
- Sólo hora de puesta en marcha:
  el acondicionador de aire comenzará a funcionar cuando haya transcurrido el tiempo fijado.
- Sólo hora de parada:
  el acondicionador de aire se detendrá cuando haya transcurrido el tiempo fijado.
- Horas de puesta en marcha y de parada:
  el acondicionador de aire comienza a funcionar y se detiene cuando hayan transcurrido las horas respectivas.

■ El temporizador simple (puesta en marcha y parada) puede configurarse sólo una vez en un periodo de 72 horas. La configuración de la hora se realiza en aumentos de una hora.

Nota:
***1. El temporizador semanal, el temporizador simple y el temporizador automático no pueden utilizarse al mismo tiempo.**
***2. El temporizador simple no funcionará si se da cualquiera de las condiciones siguientes.**
El temporizador está desactivado, el sistema está en estado anómalo, está realizándose una prueba de funcionamiento, el mando a distancia está realizando una autoevaluación o diagnóstico, el usuario está seleccionando una función o configurando el temporizador, el sistema está bajo control central. (En estas condiciones, la operación de encendido y apagado está deshabilitada).



<Cómo configurar el temporizador simple>



1. Asegúrese de que se encuentra en una pantalla de control estándar y de que el indicador de temporizador simple se muestra en la pantalla (en 1). Cuando aparezca una indicación distinta de la del temporizador simple, cámbielo a SIMPLE TIMER (TEMPORIZADOR SIMPLE) utilizando la selección de funciones de la configuración de funciones del temporizador del mando a distancia (véase 8.[4]–3 (3)).
2. Pulse el botón Timer Menu ⑫, de modo que aparezca en la pantalla "Set Up" (en 2). (Recuerde que cada pulsación del botón cambia la pantalla entre "Set Up" y "Monitor").
3. Pulse el botón ON/OFF ① para mostrar los valores configurados actuales de encendido o apagado del temporizador simple. Pulse el botón una vez para ver el tiempo restante hasta el encendido y luego de nuevo para ver el tiempo restante hasta el apagado. (El indicador ON/OFF aparece en 3).
   - Temporizador "ON": el acondicionador de aire comenzará a funcionar cuando haya transcurrido el número de horas especificado.
   - Temporizador "OFF": el acondicionador de aire se detendrá cuando haya transcurrido el número de horas especificado.
4. Mostrando "ON" u "OFF" en 3: pulse el botón Set Time ⑪ apropiado según sea necesario para fijar las horas hasta el encendido (si se muestra "ON") o las horas hasta el apagado (si se muestra "OFF" en 4).
   - Rango disponible: 1 a 72 horas
5. Para fijar las horas hasta el encendido y el apagado, repita los Pasos 3 y 4.
   * Recuerde que las horas de encendido y apagado no pueden fijarse en el mismo valor.
6. Para borrar la configuración de encendido o apagado actual: Muestre el valor configurado de encendido o apagado (véase el paso 3) y luego pulse el botón Check (Clear) ⑩ para borrar la configuración de la hora a "—" en 4. (Si desea utilizar sólo un valor de configuración de encendido o una configuración de apagado, asegúrese de que la configuración que no desea utilizar se muestra como "—").

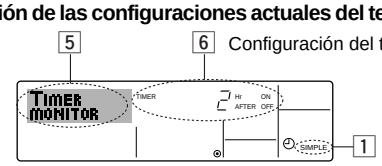
6. Temporizador

7. Después de completar los Pasos 3 y 6 arriba mencionados, pulse el botón ↵ Filter ④ para fijar el valor.

Nota:
Sus configuraciones nuevas se cancelarán si pulsa el botón Mode (Return) ② antes de pulsar el botón ↵ Filter ④.

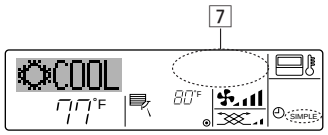
8. Pulse el botón Mode (Return) ② para regresar a la pantalla de control estándar.
9. Pulse el botón Timer On/Off ⑨ para iniciar la cuenta atrás del temporizador. Cuando el temporizador está funcionando, su valor es visible en la pantalla. **Asegúrese de que el valor del temporizador sea visible y apropiado.**

<Visualización de las configuraciones actuales del temporizador simple>

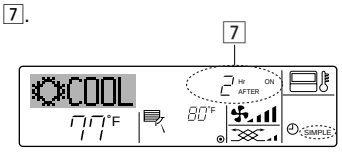


1. Asegúrese de que el indicador del temporizador simple está visible en la pantalla (en 1).
2. Pulse el botón Timer Menu ⑫, para que aparezca "Monitor" en la pantalla (en 5).
   - Si el temporizador simple de encendido o apagado está funcionando, su valor actual aparecerá en 6.
   - Si se han fijado ambos valores, encendido y apagado, aparecen alternativamente ambos valores.
3. Pulse el botón Mode (Return) ② para cerrar la pantalla del monitor y regresar a la pantalla de control estándar.

<Para desactivar el temporizador simple...>
Pulse el botón Timer On/Off ⑨ para que la configuración del temporizador ya no aparezca en la pantalla (en 7).

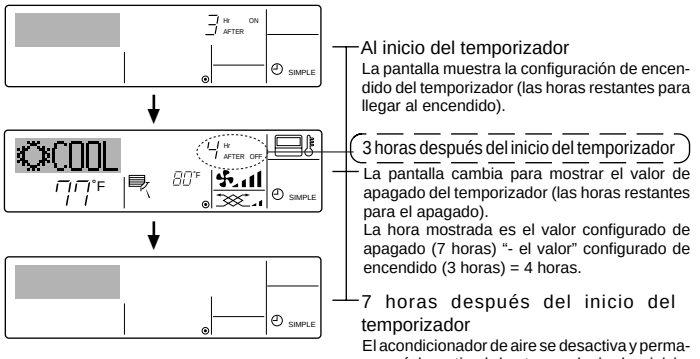


<Para iniciar el temporizador simple…>
Pulse el botón Timer On/Off ⑨ para que la configuración del temporizador sea visible en 7.



Ejemplos
Si se han configurado las horas de encendido y apagado en el temporizador simple, el funcionamiento y la pantalla son según se indica a continuación.

Ejemplo 1:
Inicie el temporizador, con la hora de encendido fijada más temprano que la hora de apagado.
Configuración de encendido: 3 horas
Configuración de apagado: 7 horas

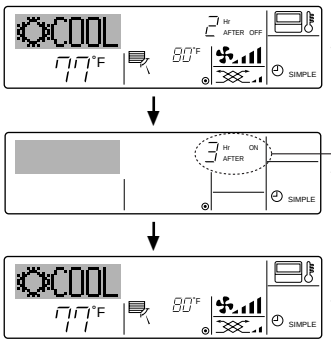


Al inicio del temporizador
La pantalla muestra la configuración de encendido del temporizador (las horas restantes para llegar al encendido).

3 horas después del inicio del temporizador
La pantalla cambia para mostrar el valor de apagado del temporizador (las horas restantes para el apagado).
La hora mostrada es el valor configurado de apagado (7 horas) "- el valor" configurado de encendido (3 horas) = 4 horas.

7 horas después del inicio del temporizador
El acondicionador de aire se desactiva y permanecerá desactivado hasta que alguien lo reinicie.

Ejemplo 2:
Inicie el temporizador, con la hora de apagado fijada más temprano que la hora de encendido
Configuración de encendido: 5 horas
Configuración de apagado: 2 horas



Al inicio del temporizador
La pantalla muestra el valor de apagado del temporizador (las horas restantes para el apagado).

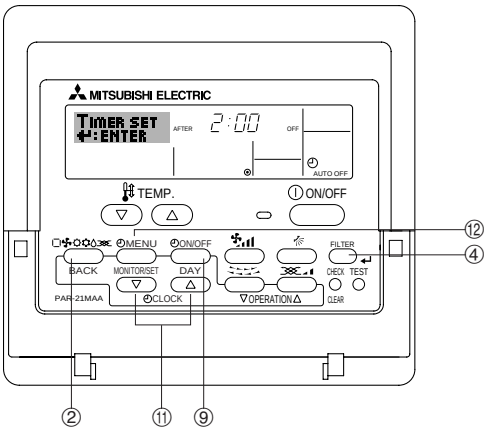
2 horas después del inicio del temporizador
La pantalla cambia para mostrar el valor de encendido del temporizador (las horas restantes para el encendido).
La hora indicada es el valor configurado de encendido (5 horas) "- el valor" configurado de apagado (2 horas) = 3 horas.

5 horas después del inicio del temporizador
El acondicionador de aire comienza a funcionar y continuará funcionando hasta que alguien lo detenga.

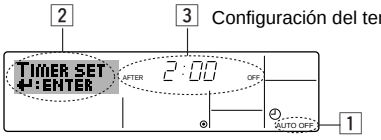
6.1.3. Temporizador de apagado automático

- Este temporizador comienza la cuenta atrás cuando el acondicionador de aire comienza a funcionar y apaga el acondicionador cuando haya transcurrido el tiempo fijado.
- Los valores disponibles abarcan desde 30 minutos a 4 horas, en intervalos de 30 minutos.

Nota:
***1. El temporizador semanal, el temporizador simple y el temporizador automático no pueden utilizarse al mismo tiempo.**
***2. El temporizador Auto Off no funcionará si se dan cualquiera de las siguientes condiciones.**
El temporizador está desactivado, el sistema está en estado anómalo, está realizándose una prueba de funcionamiento, el mando a distancia está realizando una autoevaluación o diagnóstico, el usuario está seleccionando una función o configurando el temporizador, el sistema está bajo control central. (En estas condiciones, la operación de encendido y apagado está deshabilitada).



<Cómo configurar el temporizador de apagado automático>



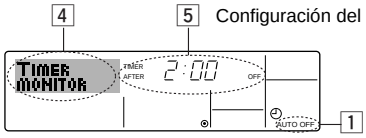
1. Asegúrese de que usted se encuentre en una pantalla de control estándar y que el indicador del temporizador de apagado automático Auto Off se muestre en la pantalla (en 1).
   Cuando aparezca una indicación distinta de la del temporizador de apagado automático, cámbielo a AUTO OFF TIMER (TEMPORIZADOR DE APAGADO AUTOMÁTICO) utilizando la selección de funciones de la configuración de funciones del temporizador del mando a distancia (véase 8.[4]–3 (3)).
2. Mantenga pulsado el botón Timer Menu ⑫ durante 3 segundos, para que aparezca "Set Up" en la pantalla (en 2).
   (Recuerde que cada pulsación del botón cambia la pantalla entre "Set Up" y "Monitor").
3. Pulse el botón Set Time apropiado ⑪ según sea necesario para configurar la hora de apagado (en 3).
4. Pulse el botón ↵ Filter ④ para fijar la configuración.

Nota:
Los datos introducidos se cancelarán si pulsa el botón Mode (Return) ② antes de pulsar el botón ↵ Filter ④.

5. Pulse el botón Mode (Return) ② para completar el procedimiento de configuración y regresar a la pantalla de control estándar.
6. Si el acondicionador de aire ya está funcionando, el temporizador comienza inmediatamente la cuenta atrás. **Asegúrese de comprobar que el valor fijado del temporizador aparece correctamente en la pantalla.**

6. Temporizador

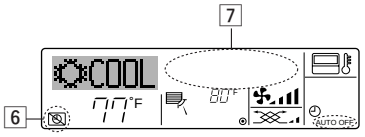
<Comprobación de la configuración actual del temporizador de apagado automático>



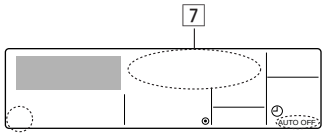
1. Asegúrese de que “Auto Off” esté visible en la pantalla (en 1).
2. Mantenga pulsado el botón Timer Menu ⑫ durante **3 segundos**, para que se indique en la pantalla “Monitor” (en 4).
   • El tiempo restante para el apagado aparece en 5.
3. Para cerrar el monitor y regresar a la pantalla Standard Control, pulse el botón Mode (Return) de ②.

<Para desactivar temporizador de apagado automático...>

● Mantenga pulsado el botón Timer On/Off ⑨ durante **3 segundos** para que aparezca “Timer Off” (en 6) y desaparezca el valor del temporizador (en 7).



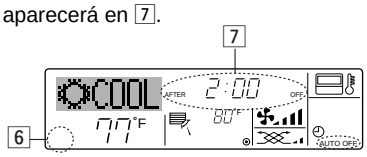
● Alternativamente, desconecte el acondicionador de aire. El valor del temporizador (en 7) desaparecerá de la pantalla.



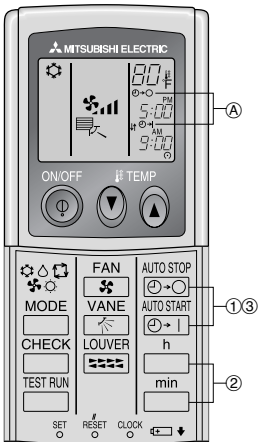
<Para iniciar el temporizador de apagado automático...>

● Mantenga pulsado el botón Timer On/Off ⑨ durante **3 segundos**. Desaparece la indicación “Timer Off” (en 6) y la configuración del temporizador aparece en la pantalla (en 7).

● Alternativamente, encienda el acondicionador de aire. El valor del temporizador aparecerá en 7.



6.2. Para controlador remoto inalámbrico



① Presione el botón AUTO STOP o AUTO START (TIMER SET).

• Se puede fijar la hora mientras parpadee el símbolo siguiente.
Temporizador de apagado: Parpadea Ⓐ.
Temporizador de encendido: Parpadea Ⓐ.
② Use los botones h y min para fijar la hora deseada.
③ Cancelación del temporizador.
Para cancelar el temporizador de apagado, presione el botón AUTO STOP.
Para cancelar el temporizador de encendido, presione el botón AUTO START.

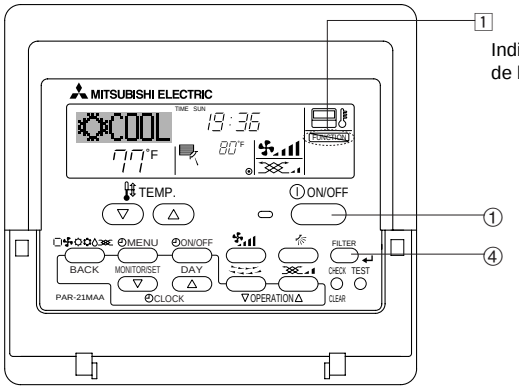
• Es posible combinar el temporizador de encendido con el de apagado.
• Al presionar el botón ① ON/OFF del mando a distancia durante el modo de temporizador para parar la unidad se cancelarán los temporizadores.
• Si no ha ajustado la hora actual, no podrá utilizar la función del temporizador.

7. Otras funciones

7.1. Bloqueo de los botones del mando a distancia (límite de función de Operación)

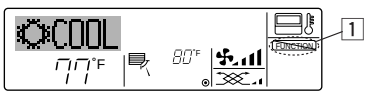
■ Si lo desea, puede bloquear los botones del mando a distancia. Puede utilizar la selección de funciones del mando a distancia para elegir el tipo de bloqueo que desea usar. (Para más información sobre selección del tipo de bloqueo, consulte la sección 8, punto [4]–2 (1)).
Específicamente, puede utilizar cualquiera de los dos tipos de bloqueo que se indican a continuación.
①Bloquear todos los botones:
bloquea todos los botones en el mando a distancia.
②Bloquear todo excepto ON/OFF (encendido/apagado):
bloquea todos los botones excepto el botón ON/OFF.

Nota:
Aparece en la pantalla el indicador “Locked” (bloqueado) para indicar que los botones están bloqueados en este momento.

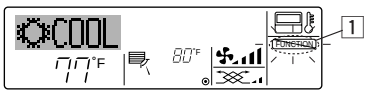


<Cómo bloquear los botones>

1. Mientras pulsa el botón Filter ④, pulse y mantenga pulsado el botón ON/OFF ① durante 2 segundos. Aparece en la pantalla el indicador “Locked” (en 1) indicando que está activado el bloqueo.
   * Si el bloqueo se ha deshabilitado en Function Selection, la pantalla mostrará el mensaje “Not Available” (no disponible) cuando pulse los botones según se describe anteriormente.

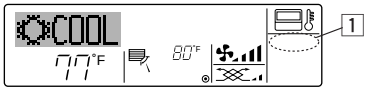


• Si pulsa un botón bloqueado, parpadeará en la pantalla el indicador “Locked” (en 1).



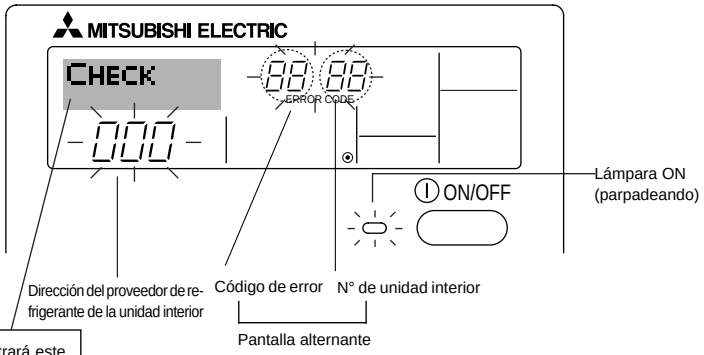
<Cómo desbloquear los botones>

1. Mientras pulsa el botón Filter ④, pulse y mantenga pulsado el botón ON/OFF ① durante 2 segundos para que el indicador “Locked” desaparezca de la pantalla (en 1).



7. Otras funciones

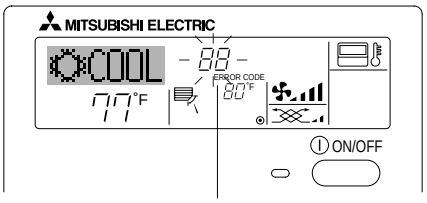
7.2. Indicación de códigos de error



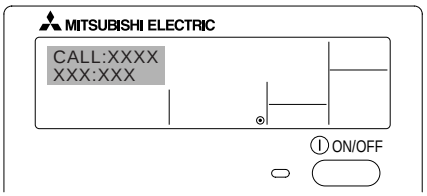
Si ha introducido un número telefónico al cual llamar en caso de problemas, la pantalla mostrará este número. (Puede configurarlo en la Selección de Función. Para más información, consulte la sección 8).

● Si parpadean la lámpara ON y el código de error: esto significa que el acondicionador de aire está estropeado y su funcionamiento se ha detenido (y no puede reanudarse). Tome nota del número de unidad indicado y del código de error; luego desconecte la alimentación del acondicionador de aire y llame a su distribuidor o proveedor de servicio técnico.

Cuando se pulsa el botón Check:



Código de error



● Si sólo parpadea el código de error (mientras la lámpara ON permanece encendida): continúa el funcionamiento, pero puede existir un problema en el sistema. En este caso, debe anotar el código de error y luego llamar a su distribuidor o proveedor de servicio técnico para asesoramiento.

* Si ha introducido un número de teléfono al cual llamar en caso de problemas, pulse el botón Check para mostrarlo en la pantalla. (Puede configurarlo en la Selección de Función. Para más información, consulte la sección 8).

8. Selección de función

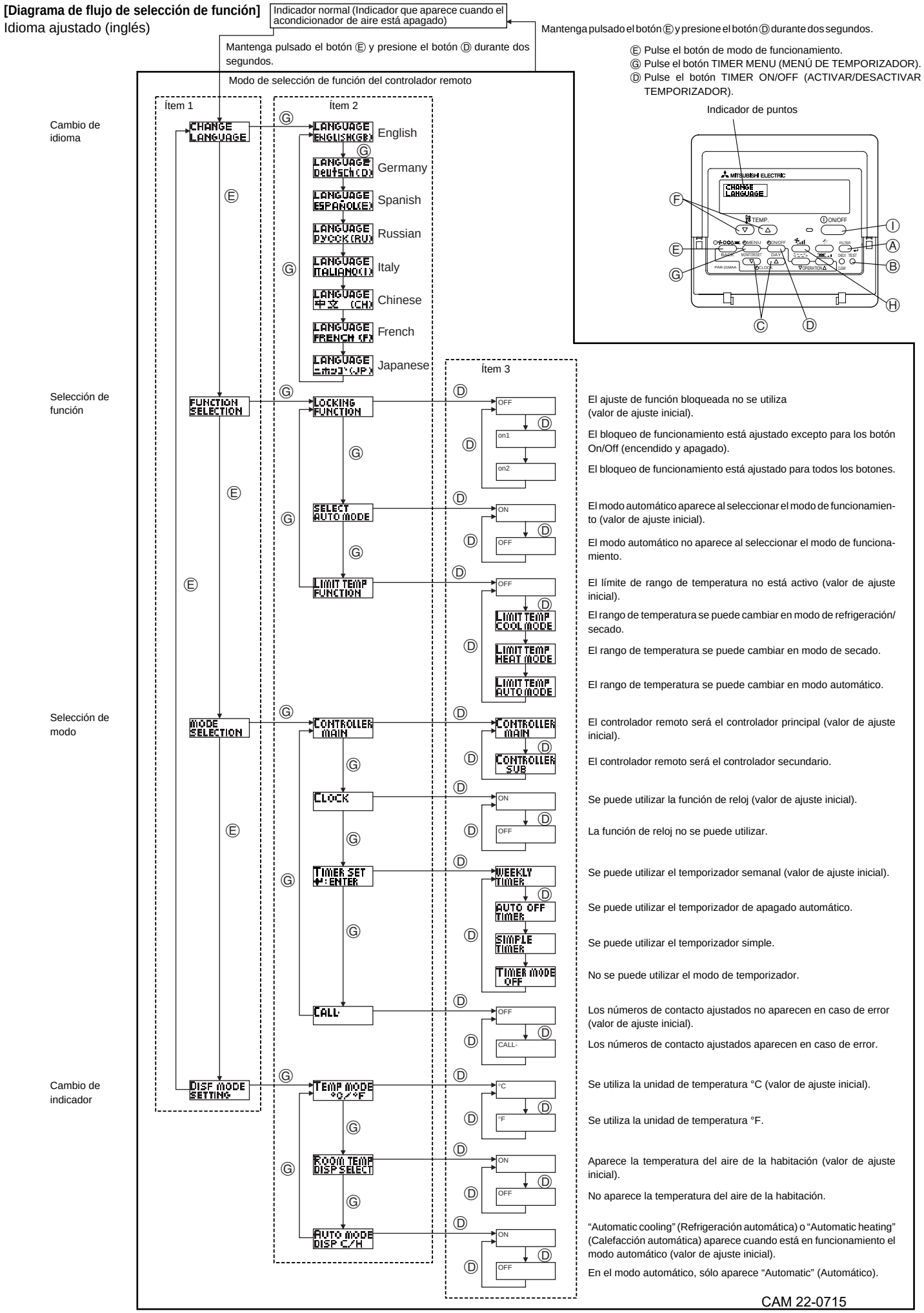
Selección de funciones del controlador remoto

El ajuste de las siguientes funciones del controlador remoto se puede cambiar utilizando el modo Selección de función del controlador remoto. Cambie el ajuste cuando sea necesario.

Ítem 1	Ítem 2	Ítem 3 (Contenido de ajuste)
1. Cambio de idioma (“CHANGE LANGUAGE”)	Ajuste del idioma que aparece en el indicador	• El indicador puede aparecer en distintos idiomas
2. Límite de funciones (“SELECCIÓN DE FUNCIÓNES”)	(1) Ajuste del límite de funciones (bloqueo de funciones) (“FUNCIÓN BLOQUEADA”)	• Ajuste del rango de límite de funcionamiento (bloqueo de funcionamiento)
	(2) Uso del ajuste de modo automático (“SELECCIÓN MODO AUTO”)	• Ajuste del uso (o no) del modo de funcionamiento “automático”
	(3) Ajuste del límite de rango de temperatura (“LIMIT TEMP CONSIGNA”)	• Ajuste del rango de temperatura (máximo, mínimo)
3. Selección de modo (“SELECCIÓN DE MODO”)	(1) Ajuste del controlador remoto principal/secundario (“CONTROL PRINCIPAL/SECUNDARIO”)	• Selección del controlador remoto principal o secundario * Si se conectan dos controladores remotos a un grupo, uno de los controladores debe seleccionarse como secundario.
	(2) Uso del ajuste del reloj (“RELOJ”)	• Ajuste del uso (o no) de la función de reloj
	(3) Ajuste de la función de temporizador (“TEMPORIZA-DOR SEMANAL”)	• Ajuste del tipo de temporizador
	(4) Ajuste de número de contacto en caso de error (“CALL.”)	• Indicador del número de contacto en caso de error • Ajuste del número de teléfono
4. Cambio de indicador (“MOSTRAR MODO”)	(1) Ajuste del indicador de temperatura °C/°F (“TEMP. GRADOS °C/°F”)	• Ajuste de la unidad de temperatura (°C o °F) que debe aparecer en el indicador
	(2) Ajuste del indicador de temperatura del aire de aspiración (“MOSTRAR TEMP.”)	• Ajuste del uso (o no) del indicador de temperatura del aire (aspiración) del interior
	(3) Ajuste del indicador de refrigeración/calefacción automática (“MOSTRAR F/C EN AUTO”)	• Ajuste del uso (o no) del indicador de “Cooling” (Refrigeración) o “Heating” (Calefacción) durante el funcionamiento en modo automático

8. Selección de función

[Diagrama de flujo de selección de función]
Idioma ajustado (inglés)



8. Selección de función

[Ajuste detallado]

[4]–1. Ajuste de Cambio de idioma

Se puede seleccionar el idioma que aparece en el indicador de puntos.

- Presione el botón [◴MENU] Ⓖ para cambiar el idioma.
  ① Inglés (GB), ② Alemán (D), ③ Español (E), ④ Ruso (RU), ⑤ Italiano (I), ⑥ Chino (CH), ⑦ Francés (F), ⑧ Japonés (JP)

Consulte la tabla del indicador de puntos.

[4]–2. Límite de funciones

(1) Ajuste del límite de funciones (bloqueo de funciones)

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ① no1: Se realiza el ajuste de bloqueo de funcionamiento en todos los botones salvo en el botón [ⓘON/OFF].
  ② no2: Se realiza el ajuste de bloqueo de funcionamiento en todos los botones.
  ③ OFF (Valor del ajuste inicial):
  No se realiza el bloqueo de funcionamiento.

* Para que el bloqueo de funcionamiento sea válido en la pantalla normal, hay que presionar los botones (Presione y mantenga pulsados a la vez los botones [FILTER] y [ⓘON/OFF] durante dos segundos) en la pantalla normal una vez que se ha realizado el ajuste anterior.

(2) Uso del ajuste de modo automático

Cuando se conecta el controlador remoto a la unidad que tiene ajustado el modo funcionamiento automático, se pueden realizar los siguientes ajustes.

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ① ON (Valor del ajuste inicial):
  Aparece el modo automático cuando se selecciona el modo de funcionamiento.
  ② OFF: No aparece el modo automático cuando se selecciona el modo de funcionamiento.

(3) Ajuste del límite de rango de temperatura

Una vez que se realiza el ajuste, se puede cambiar la temperatura dentro del rango establecido.

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ①LIMIT TEMP MODO FRÍO:
  El rango de temperatura se puede cambiar en modo refrigeración/secado.
  ②LIMIT TEMP MODO CALOR:
  El rango de temperatura se puede cambiar en modo calefacción.
  ③LIMIT TEMP MODO AUTO:
  El rango de temperatura se puede cambiar en modo automático.
  ④OFF (ajuste inicial):
  No está activo el límite de rango de temperatura.

* Cuando se ajusta una posición distinta de la de desactivación (OFF), se ajusta a la vez el límite de rango de temperatura en modo refrigeración, calefacción y automático. No obstante, no se puede limitar el rango cuando no ha cambiado el rango de temperatura establecido.

- Para disminuir o aumentar la temperatura, presione el botón [🌡TEMP. (▽) o (△)] Ⓕ.
- Para cambiar el ajuste de límite superior y el ajuste de límite inferior, presione el botón [💨] Ⓗ. El ajuste seleccionado parpadeará y ya se puede ajustar la temperatura.
- Rango ajustable
  Modo Refrigeración/Secado:
  Límite inferior : 19°C a 30°C, 67°F a 87°F
  Límite superior : 30°C a 19°C, 87°F a 67°F
  Modo Calefacción:
  Límite inferior : 17°C a 28°C, 63°F a 83°F
  Límite superior : 28°C a 17°C, 83°F a 63°F
  Modo Automático:
  Límite inferior : 19°C a 28°C, 67°F a 83°F
  Límite superior : 28°C a 19°C, 83°F a 67°F

[4]–3. Ajuste de selección de modo

(1) Ajuste del controlador remoto principal/secundario

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ①Principal: El controlador será el principal.
  ②Secundario: El controlador será el secundario.

(2) Uso del ajuste del reloj

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ①ON: Se puede usar la función de reloj.
  ②OFF: No se puede usar la función de reloj.

(3) Ajuste de la función de temporizador

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ (Elija una de las siguientes funciones).
  ①TEMPORIZADOR SEMANAL (Valor del ajuste inicial):
  Se puede usar el temporizador semanal.
  ②APAGADO AUTOMÁTICO:
  Se puede usar el temporizador de desactivación automática.
  ③TEMPORIZADOR SIMPLE:
  Se puede usar el temporizador simple.
  ④TEMPORIZADOR APAGADO:
  No se puede usar el modo temporizador.

* Cuando el uso del ajuste de reloj está desactivado (OFF), no se puede usar el “TEMPORIZADOR SEMANAL”.

(4) Ajuste de número de contacto en caso de error

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ①CALL OFF:
  Los números de contacto establecidos no aparecen en el indicador en caso de error.
  ②CALL **** *** ****:
  Los números de contacto establecidos aparecen en el indicador en caso de error.
  CALL_:
  El número de contacto se puede ajustar cuando el indicador aparece según se muestra a la izquierda.
- Ajuste de los números de contacto
  Para ajustar los números de contacto, proceda del siguiente modo.
  Mueva el cursor parpadeante para ajustar los números. Presione el botón [🌡TEMP. (▽) y (△)] Ⓕ para mover el cursor a la derecha (izquierda). Presione el botón [◴CLOCK (▽) y (△)] (Reloj) Ⓒ para ajustar los números.

[4]–4. Ajuste del cambio de indicador

(1) Ajuste del indicador de temperatura °C/°F

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ① °C: Se utiliza la unidad de temperatura en °C.
  ② °F: Se utiliza la unidad de temperatura en °F.

(2) Ajuste del indicador de temperatura del aire de aspiración

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ① ON: Aparece la temperatura del aire de aspiración.
  ② OFF: No aparece la temperatura del aire de aspiración.

(3) Ajuste del indicador de refrigeración/calefacción automática

- Para cambiar el ajuste, presione el botón [◴ON/OFF] Ⓓ.
  ① ON: Aparece la posición “Automatic cooling” (Refrigeración automática) o “Automatic heating” (Calefacción automática) en el modo automático.
  ② OFF: Sólo aparece la posición “Automatic” (Automático) en el modo automático.

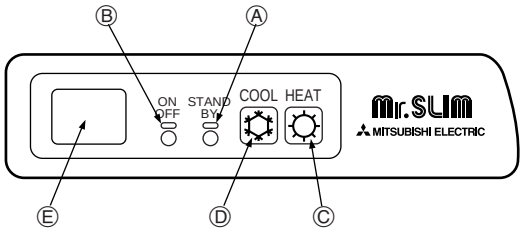
8. Selección de función

[Tabla del indicador de puntos]

Idioma ajustado		English	Germany	Spanish	Russian	Italy	Chinese	French	Japanese
Tiempo de espera de arranque		PLEASE WAIT	←	←	←	←	←	←	←
Modo de funcionamiento	Enfriamiento	COOL	Kühlen	FRÍO	Холод	COOL	制冷	FROID	冷房
	Secado	DRY	Trocknen	DESHUMI-DIFICACION	Сушка	DRY	除湿	DESHU	ドライ
	Calefacción	HEAT	Heizen	CALOR	Тепло	HEAT	制热	CHAUD	暖房
	Automático	AUTO	AUTO	AUTO-MÁTICO	Авто	AUTO	自动	AUTO	自動
	Automático (Enfriamiento)	COOL	Kühlen	FRÍO	Холод	COOL	制冷	FROID	冷房
	Automático (Calefacción)	HEAT	Heizen	CALOR	Тепло	HEAT	制热	CHAUD	暖房
	Ventilador	FAN	Lüfter	VENTI-LACIÓN	Вент	VENTI LAZIONE	送风	VENTI LATION	送風
	Ventilación	VENTI LATION	Gebläse betrieb	VENTI-LACIÓN	Вентиляция	ARIA ESTERNA	换气	VENTI LATION	換気
	Espera (calentando)	STAND BY	STAND BY	CALENTANDO	Обогрев: пауза	STAND BY	准备中	PRE CHAUFFAGE	準備中
	Descongelación	DEFROST	Abtauen	DESCONGE - LACIÓN	Оттаивание	SBRINA MENTO	除霜中	DEGIVRAGE	霜取中
Temperatura ajustada		SET TEMP	TEMP einstellen	TEMP. CONSIGNA	ЦЕЛЕВАЯ ТЕМПЕРАТУРА	IMPOSTAZIONE TEMPERTURA	设定温度	REGLAGE TEMPERATURE	設定温度
Velocidad del ventilador		FAN SPEED	Lüftergesch windigkeit	VELOCIDAD VENTILADOR	СКОРОСТЬ ВЕНТИЛЯТОРА	VELOCITA' VENTILATORE	风速	VITESSE DE VENTILATION	風速
Botón no disponible		NOT AVAILABLE	nicht Verfusbar	NO DISPONIBLE	НЕ ДОСТУПНО	NON DISPONIBILE	无效按钮	NON DISPONIBLE	無効ボタン
Comprobación (error)		CHECK	Prüfen	COMPROBAR	Проверка	CHECK	检查	CONTROLE	点検
Prueba de funcionamiento		TEST RUN	Testbetrieb	TEST FUNCIO NAMIENTO	Тестовый запуск	TEST RUN	试运转	TEST	試ウンテン
Auto-revisión		SELF CHECK	selbst-diagnose	AUTO REVISIÓN	Самодиагностика	SELF CHECK	自我诊断	AUTO CONTROLE	自己シンダン
Selección de función en la unidad		FUNCTION SELECTION	Funktion sauswahl	SELECCIÓN DE FUNCIÓN	Выбор функции	SELEZIONE FUNZIONI	功能选择	SELECTION FONCTIONS	キノウ選択
Ajuste de ventilación		SETTING OF VENTILATION	Lüfterstufen wahlen	CONFIG. VENTILACIÓN	Настройка вентустан.	IMPOSTAZIONE ARIA ESTERNA	换气设定	SELECTION VENTILATION	換気設定

Idioma ajustado	English	Germany	Spanish	Russian	Italy	Chinese	French	Japanese
Cambio de idioma	CHANGE LANGUAGE	←	←	←	←	←	←	←
Selección de función	FUNCTION SELECTION	Funktion auswahlen	SELECCIÓN DE FUNCIONES	Выбор функции	SELEZIONE FUNZIONI	功能限制	SELECTION FONCTIONS	キノウ制限
Ajuste de límite de funcionamiento de una operación	LOCKING FUNCTION	Sperr – Funktion	FUNCIÓN BLOQUEADA	Функция блокировки	BLOCCO FUNZIONI	操作限制	BLOCAGE FONCTIONS	操作モード
Utilización del ajuste de modo automático	SELECT AUTO MODE	Auswahl Auto Betrieb	SELECCIÓN MODO AUTO	Выбор режима авто	SELEZIONE MODO AUTO	自动模式	SELECTION DU MODE AUTO	自動モード
Ajuste de límite de rango de temperatura	LIMIT TEMP FUNCTION	Limit Temp Funktion	LÍMIT TEMP CONSIGNA	Ограничение уст.температ	LIMITAZIONE TEMPERATURA	温度限制	LIMITATION TEMPERATURE	温度制限
Límite de temperatura modo refrigeración/día	LIMIT TEMP COOL MODE	Limit Kühl Temp	LÍMIT TEMP MODO FRIO	Ограничено охлаждение	LIMITAZIONE MODO COOL	制冷范围	LIMITE TEMP MODE FROID	冷房
Límite de temperatura modo de calefacción	LIMIT TEMP HEAT MODE	Limit Heiz Temp	LÍMIT TEMP MODO CALOR	Ограничен обогрев	LIMITAZIONE MODO HEAT	制热范围	LIMITE TEMP MODE CHAUD	暖房
Límite de temperatura modo automático	LIMIT TEMP AUTO MODE	Limit AUTO Temp	LÍMIT TEMP MODO AUTO	Ограничен режим авто	LIMITAZIONE MODO AUTO	自动范围	LIMITE TEMP MODE AUTO	自動
Selección de modo	MODE SELECTION	Betriebsart wahlen	SELECCIÓN DE MODO	Выбор режима	SELEZIONE MODO	基本模式	SELECTION DU MODE	基本キノウ
Ajuste de controlador remoto MAIN (PRINCIPAL)	CONTROLLER MAIN	Haupt Controller	CONTROL PRINCIPAL	Основной пульт	CONTROLLO MAIN	遥控 主	TELECOMMANDE MAITRE	リモコン 主
Ajuste de controlador remoto SUB (SECUNDARIO)	CONTROLLER SUB	Neben Controller	CONTROL SECUNDARIO	Дополнительный пульт	CONTROLLO SUB	遥控 辅	TELECOMMANDE ESCLAVE	リモコン 主
Utilización del ajuste del reloj	CLOCK	Uhr	RELOJ	Часы	OROLOGIO	时钟	AFFICHAGE HORLOGE	時計
Ajuste del día de la semana y la hora	TIME SET ↵:ENTER	Uhr stellen ↵:einstellen	CONFIG RELOJ ↵:CONFIG	Часы: уст. ↵: ввод	OROLOGIO ↵: ENTER	时间 ↵: ENTER	HORLOGE ↵:ENTRER	トケイセッテイ ↵: カクテイ
Ajuste del temporizador	TIMER SET ↵: ENTER	Zeitschaltuhr ↵:einstellen	TEMPORIZA - DOR ↵:CONFIG	Таймер: уст. ↵: ввод	TIMER ↵: ENTER	定时器 ↵: ENTER	PROG HORAIRE ↵: ENTRER	タイマーセッテイ ↵: カクテイ
Visualización del temporizador	TIMER MONITOR	Uhrzeit Anzeige	VISUALIZAR TEMPORIZAD.	Просмотр таймера	VISUALIZ TIMER	定时器状态	AFFICHAGE PROG HORAIRE	タイマーモニター
Temporizador semanal	WEEKLY TIMER	Wochenzeit schalt Uhr	TEMPORIZA - DOR SEMANAL	Недельный таймер	TIMER SETTIMANALE	每周定时器	PROG HEBDO MADAIRE	タイマー週間
Modo de temporizador apagado	TIMER MODE OFF	Zeitschaltuhr AUS	TEMPORIZA - DOR APAGADO	Таймер выкл.	TIMER OFF	定时器无效	PROG HORAIRE INACTIF	タイマー無効
Temporizador de apagado automático	AUTO OFF TIMER	Auto Zeit funktion aus	APAGADO AUTOMÁTICO	Автоотключ. по таймеру	AUTO OFF TIMER	解除定时	PROG HORAIRE ARRET AUTO	タイマーケシスル ボウシ
Temporizador simple	SIMPLE TIMER	Einfache Zeitfunktion	TEMPORIZA - DOR SIMPLE	Простой таймер	TIMER SEMPLIFICATO	简易定时器	PROG HORAIRE SIMPLIFIE	タイマーカンイ
Ajuste de número de contacto en caso de avería	CALL	←	←	←	←	←	←	←
Cambio de indicación	DISP MODE SETTING	Anzeige Betriebsart	MOSTRAR MODO	Настройка инд.режима	IMPOSTAZIONE MODO DISPLAY	转换表示	AFFICHAGE SOUS MENU	表示切替
Ajuste de visualización de temperatura °C/°F	TEMP MODE °C/°F	Wechsel °C/°F	TEMP.GRADOS °C/°F	Един.темпер. °C/°F	TEMPERATURA °C/°F	温度 °C/°F	TEMPERATURE °C/°F	温度 °C/°F
Ajuste de visualización de la temperatura del aire de la habitación	ROOM TEMP DISP SELECT	Raum Temp gewahlt	MOSTRAR TEMP.	Показывать темп.в комн.	TEMPERATURA AMBIENTE	吸入温度	TEMPERATURE AMBIANTE	スイコミオンド ヒョウジ
Ajuste de visualización de refrigeración/calefacción automática	AUTO MODE DISP C/H	Auto Betrieb C/H	MOSTRAR F/C EN AUTO	Инд. Т/Х в режиме АВТО	AUTO C/H	自动表示	AFFICHAGE AUTO F/C	自動レイダン ヒョウジ

9. Funcionamiento de emergencia del controlador remoto inalámbrico



Cuando no puede utilizar el controlador remoto

Cuando se agoten las pilas del controlador remoto o éste tenga algún fallo, puede llevar a cabo el funcionamiento de emergencia mediante los botones de emergencia que se encuentran en la rejilla del controlador.

Ⓐ Luz DEFROST/STAND BY (DESCONGELACIÓN/RESERVA)

Ⓑ Luz de funcionamiento

Ⓒ Interruptor de funcionamiento de emergencia (calefacción)

Ⓓ Interruptor de funcionamiento de emergencia (refrigeración)

Ⓔ Receptor

Inicio del funcionamiento

- Para accionar el modo de enfriamiento, pulse el botón ☼ Ⓓ.
- Para accionar el modo de calefacción, pulse el botón ☼ Ⓒ.

Nota:

- **Los detalles correspondientes al modo de emergencia aparecen a continuación.**

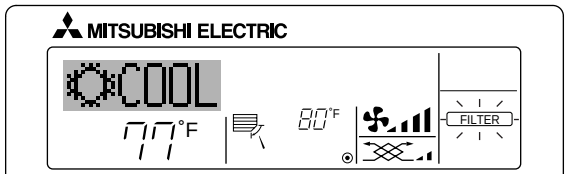
Los detalles correspondientes al MODO DE EMERGENCIA aparecen a continuación.

Modo de funcionamiento	REFRIGERACIÓN	CALEFACCIÓN
Temperatura	24°C, 75°F	24°C, 75°F
Velocidad del ventilador	Alta	Alta
Dirección del flujo de aire	Horizontal	Hacia abajo 4

Parada del funcionamiento

- Para detener el funcionamiento, pulse el botón ☼ Ⓓ o el botón ☼ Ⓒ.

10. Mantenimiento y limpieza



■ Indica que el filtro necesita una limpieza.
Solicite al personal autorizado que limpie el filtro.

■ Cuando restablezca el indicador "FILTER" (Filtro)
Cuando presiona el botón [FILTER] (Filtro) dos veces sucesivamente después de haber limpiado el filtro, el indicador se apagará y se restablecerá.

Nota:

- **Cuando se controlan dos o más tipos diferentes de unidad interior, el periodo de limpieza difiere con el tipo de filtro. Cuando llega el momento de limpiar la unidad principal, aparece "FILTER" (Filtro). Cuando se apague el indicador del filtro, el tiempo acumulado se reajustará.**
- **"FILTER" (Filtro) indica el periodo de limpieza en que se usó el acondicionador de aire bajo las condiciones generales de aire interior por tiempo. Ya que el grado de suciedad depende de las condiciones ambientales, limpie el filtro de acuerdo con las circunstancias.**
- **El periodo acumulado de limpieza del filtro difiere según el modelo.**
- **Esta indicación no está disponible en el controlador remoto inalámbrico.**

11. Localización de fallos

¿Problemas?	Aquí tiene la solución. (La unidad funciona normalmente).
El acondicionador de aire no calienta o refrigera bien.	■ Limpie el filtro (el flujo de aire se reduce cuando el filtro está sucio o atascado). ■ Compruebe el ajuste de temperatura y modifique la temperatura ajustada. ■ Asegúrese de que hay espacio suficiente alrededor de la unidad exterior. ¿Está bloqueada la entrada o la salida de aire de la unidad interior? ■ ¿Ha dejado abierta una puerta o ventana?
Cuando comienza el modo de calefacción, al principio no sale aire caliente de la unidad interior.	■ El aire caliente no empieza a salir hasta que la unidad interior se ha calentado lo suficiente.
Durante el modo de calefacción, el acondicionador de aire se detiene antes de alcanzar la temperatura ajustada para la habitación.	■ Cuando la temperatura exterior es baja y la humedad es alta, puede formarse escarcha en la unidad exterior. Si esto sucede, la unidad exterior iniciará la operación de descongelación. Una vez transcurridos unos 10 minutos, se reanudará el funcionamiento normal.
La dirección del aire cambia durante el funcionamiento o no es posible cambiar la dirección del flujo de aire.	■ Durante el modo de refrigeración, los deflectores se mueven automáticamente a la posición horizontal (inferior) tras 1 hora cuando se ha seleccionado la dirección de flujo de aire inferior (horizontal). De esta forma se evita que se acumule agua y caiga desde los deflectores. ■ Durante el modo de calefacción, los deflectores se mueven automáticamente a la posición de flujo de aire horizontal si la temperatura del flujo de aire es baja o durante el modo de descongelación.
Cuando cambia la dirección del flujo de aire, los deflectores siempre se mueven arriba y abajo antes de detenerse en la posición ajustada.	■ Cuando cambia la dirección del flujo de aire, los deflectores se mueven a la posición ajustada tras haber detectado la posición base.
Se oye un sonido de agua fluyendo o, en ocasiones, una especie de silbido.	■ Estos sonidos se pueden oír cuando el refrigerante fluye por el acondicionador de aire o cuando cambia el flujo del refrigerante.
Se oye un traqueteo o un chirrido.	■ Estos ruidos se oyen cuando las piezas rozan entre sí debido a la expansión y contracción provocadas por los cambios de temperatura.
Hay un olor desagradable en la sala.	■ La unidad interior recoge aire que contiene gases producidos por las paredes, moquetas y muebles, así como olores atrapados en las ropas y después lo devuelve a la sala.
La unidad interior expulsa un vaho o humo blanco.	■ Si la temperatura y la humedad de la unidad interior son altas, esto puede suceder inmediatamente tras encender el acondicionador de aire. ■ Durante el modo de descongelación, el aire frío puede salir hacia abajo con la apariencia de vaho.
La unidad exterior expulsa agua o vapor.	■ Durante el modo de refrigeración, puede acumularse agua y gotear de las tuberías y juntas de refrigeración. ■ Durante el modo de calefacción, puede acumularse agua y gotear del intercambiador de calor. ■ Durante el modo de descongelación, el agua del intercambiador de calor se evapora, por lo que se emite vapor de agua.
El indicador de operación no aparece en la pantalla del controlador remoto.	■ Encienda el equipo. En la pantalla del controlador remoto aparecerá el indicador "◉".

11. Localización de fallos

¿Problemas?	Aquí tiene la solución. (La unidad funciona normalmente).
En la pantalla del controlador remoto aparece "⊠".	■ Durante el control central, "⊠" aparece en la pantalla del controlador remoto. El funcionamiento del acondicionador de aire no se puede iniciar ni detener con el controlador remoto.
Al reiniciar el acondicionador de aire poco después de apagarlo, no funciona al pulsar el botón ON/OFF (ENCENDIDO/APAGADO).	■ Espere unos tres minutos. (El funcionamiento se ha detenido para proteger el acondicionador de aire).
El acondicionador de aire funciona sin haber pulsado el botón ON/OFF (ENCENDIDO/APAGADO).	■ ¿Está ajustado el temporizador de encendido? Pulse el botón ON/OFF (ENCENDIDO/APAGADO) para detener el funcionamiento. ■ ¿El acondicionador de aire está conectado a un controlador remoto central? Consulte a la persona encargada de controlar el acondicionador de aire. ■ ¿Aparece "⊠" en la pantalla del controlador remoto? Consulte a la persona encargada de controlar el acondicionador de aire. ■ ¿Se ha ajustado la función de auto-recuperación para caídas de tensión? Pulse el botón ON/OFF (ENCENDIDO/APAGADO) para detener el funcionamiento.
El acondicionador de aire se detiene sin haber pulsado el botón ON/OFF (ENCENDIDO/APAGADO).	■ ¿Está ajustado el temporizador de apagado? Pulse el botón ON/OFF (ENCENDIDO/APAGADO) para reiniciar el funcionamiento. ■ ¿El acondicionador de aire está conectado a un controlador remoto central? Consulte a la persona encargada de controlar el acondicionador de aire. ■ ¿Aparece "⊠" en la pantalla del controlador remoto? Consulte a la persona encargada de controlar el acondicionador de aire.
No es posible ajustar el funcionamiento del temporizador del controlador remoto.	■ ¿Los ajustes del temporizador no son válidos? Si el temporizador se puede ajustar, (WEEKLY), (SIMPLE) o (AUTO OFF) aparecerán en la pantalla del controlador remoto.
En la pantalla del controlador remoto aparece "PLEASE WAIT" (POR FAVOR, ESPERE).	■ Se han realizado los ajustes iniciales. Espere unos 3 minutos.
En la pantalla del controlador remoto aparece un código de error.	■ Los dispositivos de protección se han activado para proteger el acondicionador de aire. ■ No intente reparar el equipo usted mismo. Apague inmediatamente el acondicionador de aire y póngase en contacto con su distribuidor. Asegúrese de indicar al distribuidor el nombre del modelo y la información que aparecía en la pantalla del controlador remoto.
Se oye un ruido de drenaje de agua o rotación de motor.	■ Cuando se detiene el funcionamiento de refrigeración, la bomba de drenaje se activa y luego se detiene. Espere unos 3 minutos.
El ruido es mayor de lo indicado en las especificaciones.	■ El nivel de ruido del funcionamiento interior depende de la acústica de la sala en cuestión tal y como se indica en la siguiente tabla, por lo que puede ser superior a los valores de las especificaciones, que se midieron en salas sin eco.
No aparece nada en la pantalla del controlador remoto inalámbrico, las indicaciones apenas se ven o la unidad interior no recibe las señales a menos que el controlador remoto esté muy cerca.	■ Las pilas apenas tienen carga. Sustitúyalas y pulse el botón Reset (Restablecimiento). ■ Si la situación no cambia al sustituir las pilas, asegúrese de que están colocadas con la polaridad correcta (+, –).
La luz de funcionamiento situada junto al receptor del controlador remoto inalámbrico de la unidad interior parpadea.	■ La función de autodiagnóstico se ha activado para proteger el acondicionador de aire. ■ No intente reparar el equipo usted mismo. Apague inmediatamente el acondicionador de aire y póngase en contacto con su distribuidor. Asegúrese de indicar al distribuidor el nombre del modelo.

	Salas de alta absorbencia del sonido	Salas normales	Salas de baja absorbencia del sonido
Ejemplos de lugares	Estudio de radiotransmisión, salas de mezclas, etc.	Sala de recepción, hall de un hotel, etc.	Oficina, habitación de hotel
Niveles de ruido	3 a 7 dB	6 a 10 dB	9 a 13 dB

12. Especificaciones

Modelo		PLA-A12AA	PLA-A18AA	PLA-A24AA	PLA-A30AA	PLA-A36AA	PLA-A42AA
Alimentación (Fase, Voltaje <V>/Frecuencia <Hz>)		Monofase 208/230, 60					
Motor del ventilador	<FLA>	0,79	0,79	0,79		1,25	
MCA	<A>	1	1	1	1	2	2
MOCP	<A>	15	15	15	15	15	15
Dimensión (altura)	<inch>	10-3/16(1-3/16)				11-3/4(1-3/16)	
Dimensión (ancho)	<inch>	33-1/16(37-3/8)					
Dimensión (profundidad)	<inch>	33-1/16(37-3/8)					
Flujo de aire	DRY <CFM>	390-420-460-490	530-570-640-710			710-810-920-990	
(Bajo-Media 2-Media 1-Alto)	WET <CFM>	350-380-420-450	490-530-600-670			670-770-880-950	
Nivel de ruido (Bajo-Media 2-Media 1-Alto)	<dB>	27-28-29-31	28-30-32-34			33-36-39-41	
Peso neto	<lbs>	49(11)	53(11)			66(11)	

*1 La figura entre paréntesis () hace referencia a las REJILLAS.

Modelo		PKA-A12GA	PKA-A18GA	PKA-A24FA	PKA-A30FA	PKA-A36FA
Alimentación (Fase, Voltaje <V>/Frecuencia <Hz>)		Monofase 208/230, 60				
Motor del ventilador	<FLA>	0,33		0,43		0,52
MCA	<A>	1	1	1	1	1
MOCP	<A>	15	15	15	15	15
Dimensión (altura)	<inch>	13-3/8		13-3/8		
Dimensión (ancho)	<inch>	39		55-1/8		66-1/8
Dimensión (profundidad)	<inch>	9-1/4		9-1/4		
Flujo de aire	DRY <CFM>	320-350-390-425		530-705		780-990
(Bajo-Media 2-Media 1-Alto)	WET <CFM>	290-315-350-380		480-635		700-890
Nivel de ruido (Bajo-Media 2-Media 1-Alto o Bajo-Alto)	<dB>	36-38-41-43		39-45		46-49
Peso neto	<lbs>	35		53		62

Modelo		PKA-A12GAL	PKA-A18GAL	PKA-A24FAL	PKA-A30FAL	PKA-A36FAL
Alimentación (Fase, Voltaje <V>/Frecuencia <Hz>)		Monofase 208/230, 60				
Motor del ventilador	<FLA>	0,33		0,43		0,52
MCA	<A>	1	1	1	1	1
MOCP	<A>	15	15	15	15	15
Dimensión (altura)	<inch>	13-3/8		13-3/8		
Dimensión (ancho)	<inch>	39		55-1/8		66-1/8
Dimensión (profundidad)	<inch>	9-1/4		9-1/4		
Flujo de aire	DRY <CFM>	320-350-390-425		530-705		780-990
(Bajo-Media 2-Media 1-Alto)	WET <CFM>	290-315-350-380		480-635		700-890
Nivel de ruido (Bajo-Media 2-Media 1-Alto o Bajo-Alto)	<dB>	36-38-41-43		39-45		46-49
Peso neto	<lbs>	35		53		62

Modelo		PCA-A24GA	PCA-A30GA	PCA-A36GA	PCA-A42GA
Alimentación (Fase, Voltaje <V>/Frecuencia <Hz>)		Monofase 208/230, 60			
Motor del ventilador	<FLA>	0,53		0,69	
MCA	<A>	1	1	1	1
MOCP	<A>	15	15	15	15
Dimensión (altura)	<inch>	8-1/4		10-5/8	
Dimensión (ancho)	<inch>	51-9/16			
Dimensión (profundidad)	<inch>	26-3/4			
Flujo de aire	DRY <CFM>	495-530-565-635		705-740-810-880	
(Bajo-Media 2-Media 1-Alto)	WET <CFM>	445-480-510-570		635-670-730-790	
Nivel de ruido (Bajo-Media 2-Media 1-Alto)	<dB>	37-39-41-43		40-41-43-45	
Peso neto	<lbs>	75		82	

This product is designed and intended for use in the residential, commercial and light-industrial environment.

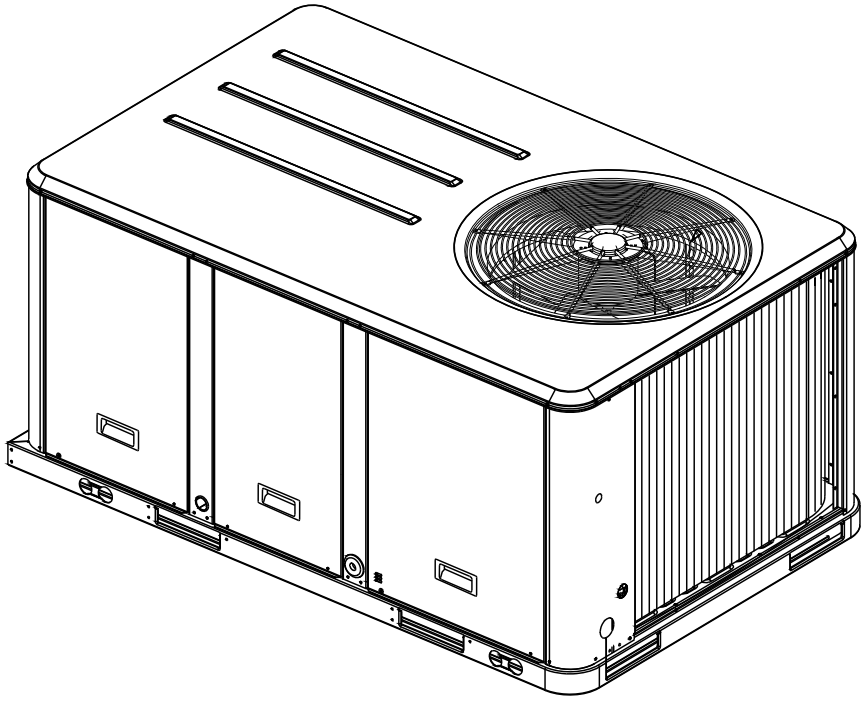
Please be sure to put the contact address/telephone number on this manual before handing it to the customer.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

Installation, Operation, and Maintenance

Packaged Rooftop Air Conditioners Precedent™ — Electric/Electric

3 to 10 Tons – 60 Hz



Model Numbers:	TSC036G - TSC060G	THC037E - THC067E
Model Numbers:	TSC072H - TSC120H	THC048F - THC120F
Model Numbers:	THC036E - THC072E	

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

April 2020 **RT-SVX22V-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

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Revision History

- Implementation of separation of circuit control box, 3-phase OD motors, and Title 24 and SZVAV options
- Affects 6 to 10 ton standard efficiency models
- Added Sequence of Operation to Start-Up

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Model Number Descriptions - 3 to 10 Tons (T/Y)

Digit 1 — Unit Type
T = DX Cooling
Y = DX Cooling, Gas Heat

Digit 2 — Efficiency
S = Standard Efficiency
H = High Efficiency

Digit 3 — Airflow
C = Convertible

Digit 4,5,6 — Nominal Gross Cooling Capacity (MBh)
036 = 3 Ton
048 = 4 Ton
060 = 5 Ton
072 = 6 Ton
074 = 6 Ton, Dual Compressor
090 = 7.5 Ton, Single Compressor
092 = 7.5 Ton, Dual Compressor
102 = 8.5 Ton
120 = 10 Ton

Digit 7 — Major Design Sequence
E = R-410A Refrigerant
F = Microchannel Type Condenser Coils[1]
G = Microchannel Type Evaporator and Condenser Coils
H = Major Design Sequence

Digit 8 — Voltage Selection
1 = 208/230/60/1
3 = 208–230/60/3
4 = 460/60/3
W = 575/60/3

Digit 9 — Unit Controls
E = Electromechanical
R = ReliaTel™ Microprocessor

Digit 10 — Heating
Note: *Applicable to Digit 1, T models only.*
0 = No Electric Heat
A = 5 kW (1 phase)[2]
B = 6 kW (3 phase)
C = 9 kW (3 phase)
D = 10 kW (1 phase)[2]
E = 12 kW (3 phase)
F = 14 kW (1 phase)[2]
G = 18 kW (1&3 phase)
J = 23 kW (3 phase)
K = 27 kW (3 phase)
N = 36 kW (3 phase)
P = 54 kW (3 phase)

Note: *Applicable to Digit 1, Y models only.*
L = Low Heat
M = Medium Heat
H = High Heat
X = Low Heat, Stainless Steel Heat Exchanger
Y = Medium Heat, Stainless Steel Heat Exchanger
Z = High Heat, Stainless Steel Heat Exchanger

Digit 11 — Minor Design Sequence
A = First Sequence[3]
B = Second Sequence[4]

Digit 12, 13 — Service Sequence
** = Factory Assigned

Digit 14 — Fresh Air Selection
0 = No Fresh Air
A = Manual Outside Air Damper 0–50%[5]
B = Motorized Outside Air Damper 0 50%[6]
C = Economizer, Dry Bulb 0–100% without Barometric Relief[7]
D = Economizer, Dry Bulb 0–100% with Barometric Relief[7]
E = Economizer, Reference Enthalpy 0-100% without Barometric Relief[7,8]
F = Economizer, Reference Enthalpy 0-100% with Barometric Relief[7,8]
G = Economizer, Comparative Enthalpy 0–100% without Barometric Relief[7,8]
H = Economizer, Comparative Enthalpy 0–100% with Barometric Relief[7,8]
K = Low Leak Economizer with Barometric Relief
M = Low Leak Economizer with Barometric Relief
P = Low Leak Economizer with Comparative Enthalpy with Barometric Relief

Digit 15 — Supply Fan/Drive Type/Motor
0 = Standard Drive[9]
1 = Oversized Motor
2 = Optional Belt Drive Motor[10]
6 = Single Zone VAV[11,12]
7 = Multi-Speed Indoor Fan[13]
E = VAV Supply Air Temperature Controls Standard Motor[12]

Digit 16 — Hinged Service Access/Filters
0 = Standard Panels/Standard Filters
A = Hinged Access Panels/Standard Filters
B = Standard Panels/2" MERV 8 Filters
C = Hinged Access Panels/2" MERV 8 Filters
D = Standard Panels/2" MERV 13 Filters
E = Hinged Access Panels/2" MERV 8 Filters

Digit 17 — Condenser Coil Protection
0 = Standard Coil
1 = Standard Coil with Hail Guard
2 = Black Epoxy Coil Pre-Coated Condenser Coil[13]
3 = Black Epoxy Coil Pre-Coated Condenser Coil with Hail Guard[14]
4 = CompleteCoat™ with Condenser Coil
5 = CompleteCoat™ with Hail Guard

Digit 18 — Through-the-Base Provisions
Note: *Applicable to Digit 1, T or Y models only.*
0 = No Through-the-Base Provisions
A = Through-the-Base Electric[15]

Note: *Applicable to Digit 1, Y models only.*
B = Through-the-Base Gas Piping[16]
C = Through-the-Base Electric and Gas Piping[16]

Digit 19 — Disconnect/Circuit Breaker (three-phase only)
0 = No Disconnect/No Circuit Breaker
1 = Unit Mounted/Non-Fused Disconnect[15]
2 = Unit Mounted Circuit Breaker[15]

Digit 20— Convenience Outlet
0 = No Convenience Outlet
A = Unpowered Convenience Outlet
B = Powered Convenience Outlet (three-phase only)[17]

Digit 21— Communications Options[8]
0 = No Communications Interface
1 = Trane® Communications Interface
2 = LonTalk® Communications Interface
3 = Novar 2024 Controls[18]
4 = Novar 3051 Controls without Zone Sensor[18]
5 = Novar 3051 Controls Interface with DCV[18]
6 = BACnet® Communications Interface
7 = Trane® Air-Fi™ Communications Interface[19]

Digit 22— Refrigeration System Option
0 = Standard Refrigeration System[20]
B = Dehumidification Option[21,22]

Digit 23— Refrigeration Controls
Note: *Applicable to Digit 7 = E, F, G,H.*
0 = No Refrigeration Control[23]
1 = Frostat™ [24,25]

Digit 24— Smoke Detector[26]
0 = No Smoke Detector
A = Return Air Smoke Detector[27,28]
B = Supply Air Smoke Detector
C = Supply and Return Air Smoke Detectors[27,28]
D = Plenum Smoke Detector

Digit 25— System Monitoring Controls
0 = No Monitoring Control[29]
1 = Clogged Filter Switch[29]
2 = Fan Filter Switch[29]
3 = Discharge Air Sensing Tube[29]
4 = Clogged Filter Switch and Fan Filter Switch[29]
5 = Clogged Filter Switch and Discharge Air Sensing Tube[29]
6 = Fan Failure Switch and Discharge Air

Model Number Descriptions - 3 to 10 Tons (T/Y)

Sensing Tube[29]
7 = Clogged Filter Switch, Fan Failure Switch and Discharge Air Sensing Tube[29]
8 = Novar Return Air Sensor (NOVAR 2024)[30,18]
9 = Novar Zone Temp Sensor (NOVAR 3051)[31,18]
A = Condensate Drain Pan Overflow Switch)
B = Clogged Filter Switch[29] and Condensate Drain Pan Overflow Switch
C = Fan Failure Switch[29] and Condensate Drain Pan Switch
D = Discharge Air Sensing[29] and Condensate Overflow Switch
E = Clogged Filter Switch[29], Fan Failure Switch and Condensate Drain Pan Overflow Switch
F = Clogged Filter Switch[29], Discharge Air Sensing Tube[29] and Condensate Drain Pan Overflow Switch
G = Fan Failure Switch, Discharge Air Sensing Tube[29] and Condensate Drain Pan Overflow Switch
H = Clogged Filter Switch[29], Fan Failure Switch[29], Discharge Air Sensing[29] and Condensate Drain Pan Overflow Switch

Digit 26— System Monitoring Controls

0 = No Monitoring Control
A = Demand Control Ventilation (CO_2)[32,33]
B = Low Leak Economizer with FDD (Fault Detection & Diagnostics)
C = FDD (Fault Detection & Diagnostics) with DCV (Demand Control Ventilation)

Digit 27— Unit Hardware Enhancements

0 = No Enhancements
1 = Stainless Steel Drain Pan

Digit 31— Advanced Unit Controls

0 = Standard Unit Controls
1 = Human Interface

Model Number Notes

1. Standard on T/YSC 6, 7.5 (single and dual systems), 8.5, 10 ton standard efficiency models and T/YHC 4, 5, 6, 7.5, 8.5, 10 ton MCHE high efficiency models (except for 4, 5, 6 ton dehumidification models).
2. Available on 3 to 5 ton models.
3. Available for all models except gas/electric, 3 to 5 tons high efficiency, single phase.
4. Available for gas/electric, 3 to 5 tons, high efficiency, single phase models.
5. Manual outside air damper will ship factory supplied within the unit, but must be field installed.
6. Motorized outside air damper is not available on multi-speed or SZVAV (single zone variable air volume) products.
7. Economizer with barometric relief is for downflow configured units only. Order economizer without barometric relief for horizontal configuration. Barometric relief for horizontal configured units must be ordered as field installed accessory.
8. Not available with electromechanical controls.
9. Multi-speed, direct drive motor with no belt drive option is standard on 3 to 5 ton, standard efficiency, 14 SEER units. Multi-speed, direct drive motor with a belt drive option is available for 3 to 5 ton, 15 SEER units. On 6 to 10 tons, multispeed direct drive is standard on all 10 ton and 6 (074) to 8.5 ton high efficiency. Belt drive is standard on all other units. Table 1, p. 9.
10. Reference Table 1, p. 9.
11. Single zone VAV is only available on 6 to 10 tons high efficiency and 7.5 to 10 ton standard efficiency products with ReliaTel™ controls.
12. Discharge air sensing is also standard equipment on units with single zone and supply air temperature control VAV.
13. Multi-speed indoor fan available only on 6, 7.5 & 8.5 tons high efficiency, and 7.5 to 10 ton products with ReliaTel™ controls.
14. Epoxy coil and epoxy with hail guard options are not available for units with microchannel condenser coil.
15. Through-the-base electric required when ordering disconnect/circuit breaker options.
16. Includes gas piping and shutoff (field assembly required).
17. Requires use of disconnect or circuit breaker. Reference Table 1, p. 9.
18. Novar is not available with SZVAV products.
19. Must be used with BACnet® open protocol.
20. Standard metering devices are TXVs.
21. Requires selection of 2" pleated filters (option B or C) for Digit 16.
22. Not available on all single phase or standard efficiency.
23. High pressure control is standard on all units.
24. Frostat™ cannot be field installed in electro-mechanical units.
25. Frostat™ standard on Y/TSC036 to 060G and T/YSC090H electromechanical, multi-speed and SZVAV (single zone variable air volume) products.
26. Not available with high temperature duct sensor accessory.
27. The return air smoke detector may not fit up or work properly on the Precedent™ units when used in conjunction with 3rd party accessories such as bolt on heat wheels, economizers and power exhaust. Do not order the return air smoke detectors when using this type of accessory.
28. Return air smoke detector cannot be ordered with Novar controls.
29. These options are standard when ordering Novar controls.
30. This option is used when ordering Novar controls.
31. Novar sensor utilized with Digit 21 = (4) Novar 3051 controls without zone sensor.
32. Demand control ventilation not available with electromechanical controls.
33. Demand control ventilation option includes wiring only. The $C0_2$ sensor is a field-installed only option.

Model Number Descriptions - 3 to 10 Tons (T/Y)

Table 1. Digit 15 Selection Details

Digit 15 = 0
Standard Efficiency
3 Phase (3 to 5 Ton) = Multispeed Direct Drive Motor
3 Phase (6 to 8.5 Ton) = Belt Drive
3 Phase (10 Ton) = Ultra High Efficiency Direct Drive Plenum Fan
High Efficiency
1 Phase = High Efficiency Multispeed Direct Drive Motor
3 Phase (3 to 5 ton) = High Efficiency Multispeed Direct Drive Motor
3 Phase (3 to 5 ton w/Dehumidification) = Belt Drive Motor
3 Phase [6 (074) to 10 ton] = Ultra High Efficiency Direct Drive Plenum Fan
Digit 15 = 2
Standard Efficiency
3 Phase = Not Available
High Efficiency
1 Phase = Not Available
3 Phase (3 to 5 tons) = May be Ordered
3 Phase (3 to 5 tons w/dehumidification) = Not Available
3 Phase (6 to 10 tons) = Not Available

Table 2. Not Available in Model Number

Standard Efficiency
3 to 5 Tons and 10 Ton w/575V
High Efficiency
3 to 5 Tons w/Standard Indoor Motor w/460V
High Efficiency 575V

Model Number Descriptions - 3 to 5 Tons (T/Y - 17 Plus)

Digit 1 - Unit Type

T DX Cooling
Y DX Cooling, Gas Heat

Digit 2 - Efficiency

S Standard Efficiency
H High Efficiency

Digit 3 - Airflow

C Convertible

Digit 4,5,6 - Nominal Gross Cooling Capacity (MBh)

037 3 Ton
047 4 Ton
067 5 Ton

Digit 7 - Major Design Sequence

E R-410A Refrigerant

Digit 8 - Voltage Selection

3 208-230/60/3
4 460/60/3
W 575/60/3

Digit 9 - Unit Controls

R ReliaTel™ Microprocessor

Digit 10 - Heating Capacity

Note: *Applicable to Digit 1, T models only*

0 No Electric Heat
B 6 kW (3 phase)
E 12 kW (3 phase)
G 18 kW (1&3 phase)
J 23 kW (3 phase)

Note: *Applicable to Digit 1, Y models only*

L Low Heat
M Medium Heat
H High Heat
X Low Heat, Stainless Steel Heat Exchanger
Y Medium Heat, Stainless Steel Heat Exchanger
Z High Heat, Stainless Steel Heat Exchanger

Digit 11 - Minor Design Sequence

A First Sequence[15]

Digit 12,13 - Service Sequence

** Factory Assigned

Digit 14 - Fresh Air Selection

0 No Fresh Air
A Manual Outside Air Damper 0-50%[1]
B Motorized Outside Air Damper 0-50%
C Economizer, Dry Bulb 0-100% without Barometric Relief[4]
D Economizer, Dry Bulb 0-100% with Barometric Relief[4]
E Economizer, Reference Enthalpy 0-100% without Barometric Relief[4]
F Economizer, Reference Enthalpy 0-100% with Barometric Relief[4]
G Economizer, Comparative Enthalpy 0-100% without Barometric Relief[4]
H Economizer, Comparative Enthalpy 0-100% with Barometric Relief[4]
K Low Leak Economizer with Barometric Relief
M Low Leak Economizer with Reference Enthalpy with Barometric Relief
P Low Leak Economizer with Comparative Enthalpy with Barometric Relief

Digit 15 - Supply Fan/Drive Type/ Motor

0 Standard Drive[3]
6 Single Zone VAV[20]
E VAV Supply Air Temperature Control Standard Motor[20]

Digit 16 - Hinged Service Access/Filters

0 Standard Panels/Standard Filters
A Hinged Access Panels/Standard Filters
B Standard Panels/2" MERV 8 Filters
C Hinged Access Panels/2" MERV 8 Filters
D Standard Panels/2" MERV 13 Filters
E Hinged Access Panels/2" MERV 13 Filters

Digit 17 - Condenser Coil Protection

0 Standard Coil
1 Standard Coil with Hail Guard
2 Black Epoxy Pre-Coated Condenser Coil
3 Black Epoxy Pre-Coated Condenser Coil with Hail Guard
4 CompleteCoat™ Condenser Coil
5 CompleteCoat™ Condenser Coil with Hail Guard

Digit 18 - Through the Base Provisions

0 No Through-the-Base Provisions
A Through-the-Base Electric[5]
B Through-the-Base Gas Piping[12]
C Through-the-Base Electric and Gas Piping[12]

Digit 19 - Disconnect/Circuit Breaker (three-phase only)

0 No Disconnect/No Circuit Breaker
1 Unit Mounted Non-Fused Disconnect[5]
2 Unit Mounted Circuit Breaker[5]

Digit 20 - Convenience Outlet

0 No Convenience Outlet
A Unpowered Convenience Outlet
B Powered Convenience Outlet (three-phase only)[6]

Digit 21 - Communications Options

0 No Communications Interface
3 Novar 2024 Controls
4 Novar 3051 Controls without Zone Sensor
5 Novar 3051Controls Interface with DCV

Digit 22 - Refrigeration System Option

0 Standard Refrigeration System[7]
B Dehumidification Option[16]

Digit 23 - Refrigeration Controls

Note: *Applicable to Digit 7 = E*

0 No Refrigeration Control[2]
1 Frostat™

Digit 24 - Smoke Detector[13]

0 No Smoke Detector
A Return Air Smoke Detector[8,9]
B Supply Air Smoke Detector
C Supply and Return Air Smoke Detectors[8,9]
D Plenum Smoke Detector

Digit 25 - System Monitoring Controls

0 No Monitoring Control[10]
1 Clogged Filter Switch[10]
2 Fan Failure Switch[10]
3 Discharge Air Sensing Tube[10]
4 Clogged Filter Switch and Fan Failure Switch[10]
5 Clogged Filter Switch and Discharge Air Sensing Tube[10]
6 Fan Failure Switch and Discharge Air Sensing Tube[10]
7 Clogged Filter Switch, Fan Failure Switch and Discharge Air Sensing Tube[10]
8 Novar Return Air Sensor (NOVAR 2024)[11,19]
9 Novar Zone Temp Sensor (NOVAR 3051)[14,19]

Model Number Descriptions - 3 to 5 Tons (T/Y - 17 Plus)

A Condensate Drain Pan Overflow Switch
B Clogged Filter Switch[10] and Condensate Drain Pan Overflow Switch
C Fan Failure Switch[10] and Condensate Drain Pan Overflow Switch
D Discharge Air Sensing[10] and Condensate Drain Pan Overflow Switch
E Clogged Filter Switch[10], Fan Failure Switch[10] and Condensate Drain Pan Overflow Switch
F Clogged Filter Switch[10], Discharge Air Sensing Tube[10] and Condensate Drain Pan Overflow Switch
G Fan Failure Switch[10], Discharge Air Sensing Tube[10] and Condensate Drain Pan Overflow Switch
H Clogged Filter Switch[10], Fan Failure Switch[10], Discharge Air Sensing[10] and Condensate Drain Pan Overflow Switch

Digit 26 - System Monitoring Controls

0 No Monitoring Controls
A Demand Control Ventilation (CO_2)[17,18]
B Low Leak Economizer with FDD (Fault Detection & Diagnostics)
C FDD (Fault Detection & Diagnostics) with DCV (Demand Control Ventilation)

Digit 27 - Unit Hardware Enhancements

0 No Enhancements
1 Stainless Steel Drain Pan

Digit 31 - Advanced Unit Controls

0 Standard Unit Controls
1 Human Interface

Model Number Notes

1. Manual outside air damper will ship factory supplied within the unit, but must be field installed.
2. High pressure control is standard on all units.
3. Direct drive is standard for 3 to 5 ton variable stage units.

Digit 15 = 0, 6
3 Phase (3-5 ton) - High Efficiency Constant CFM

4. Economizer with Barometric Relief is for downflow configured units only. Order Economizer without Barometric Relief for horizontal configuration. Barometric Relief for horizontal configured units must be ordered as field installed accessory.
5. Through the base electric required when ordering disconnect/circuit breaker options.
6. Requires use of Disconnect or Circuit Breaker.

Not Available
High Efficiency
3 to 5 ton w/Standard Indoor Motor w/460V or 575V

7. Standard metering devices are TXVs.
8. The return air smoke detector may not fit up or work properly on the Precedent units when used in conjunction with 3rd party accessories such as bolt on heat wheels, economizers and power exhaust. Do not order the return air smoke detectors when using this type of accessory.
9. Return Air Smoke Detector cannot be ordered with Novar Controls.
10. These options are standard when ordering Novar Controls.
11. This option is used when ordering Novar Controls.
12. Includes gas piping and shutoff (field assembly required).
13. Not available with high temperature duct sensor accessory.
14. Novar Sensor utilized with Digit 21 = (4) Novar 3051 Controls without Zone Sensor.
15. Available for T/Y 3,4,5 ton high efficiency models.
16. Requires selection of 2" Pleated Filters (option B or C) for Digit 16.
17. Demand Control Ventilation not available with electromechanical controls.
18. Demand Control Ventilation Option includes wiring only. The CO_2 sensor is a field-installed only option.
19. Novar is not available with SZVAV products.
20. Discharge Air Sensing is also standard equipment on units with Single Zone and Supply Air Temperature Control VAV.
21.

General Information

Unit Inspection

As soon as the unit arrives at the job site

- Verify that the nameplate data matches the data on the sales order and bill of lading (including electrical data).
- Verify that the power supply complies with the unit nameplate specifications.
- Visually inspect the exterior of the unit, including the roof, for signs of shipping damage.

If the job site inspection of the unit reveals damage or material shortages, file a claim with the carrier immediately. Specify the type and extent of the damage on the "bill of lading" before signing.

- Visually inspect the internal components for shipping damage as soon as possible after delivery and before it is stored. Do not walk on the sheet metal base pans.
- If concealed damage is discovered, notify the carrier's terminal of damage immediately by phone and by mail. Concealed damage must be reported within 15 days.
- Request an immediate joint inspection of the damage by the carrier and the consignee. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- Notify the appropriate sales representative before installing or repairing a damaged unit.

Storage

Take precautions to prevent condensate from forming inside the unit's electrical compartments and motors if:

1. the unit is stored before it is installed; or,
2. the unit is set on the roof curb, and temporary heat is provided in the building. Isolate all side panel service entrances and base pan openings (e.g., conduit holes, Supply Air and Return Air openings, and flue openings) from the ambient air until the unit is ready for start-up.

Note: *Do not use the unit's heater for temporary heat without first completing the start-up procedure detailed under "Unit Start-Up," p. 50".*

The manufacturer will not assume any responsibility for equipment damage resulting from condensate accumulation on the unit's electrical and/or mechanical components.

Unit Nameplate

A Mylar unit nameplate is located on the unit's corner support next to the filter access panel. It includes the unit model number, serial number, electrical characteristics, refrigerant charge, as well as other pertinent unit data.

Compressor Nameplate

The nameplate for the compressors are located on the side of the compressor.

Microchannel Coil Barcode ID

Barcode decal used for coil part identification can be located on the header and top of coil's inlet/outlet side.

Unit Description

Before shipment, each unit is leak tested, dehydrated, charged with refrigerant and compressor oil, and run tested for proper control operation.

The condenser coils are either aluminum fin, mechanically bonded to copper tubing or all aluminum microchannel.

Direct-drive, vertical discharge condenser fans are provided with built-in thermal overload protection.

There are two control systems offered for these units. The electromechanical control option uses a thermostat to perform unit functions. The ReliaTel™ Control Module is a microelectronic control system that is referred to as "Refrigeration Module" (RTRM). The acronym RTRM is used extensively throughout this document when referring to the control system network.

These modules through Proportional/Integral control algorithms perform specific unit functions that governs unit operation in response to; zone temperature, supply air temperature, and/or humidity conditions depending on the application. The stages of capacity control for these units are achieved by starting and stopping the compressors.

The RTRM is mounted in the control panel and is factory wired to the respective internal components. The RTRM receives and interprets information from other unit modules, sensors, remote panels, and customer binary contacts to satisfy the applicable request for cooling.

Economizer Control Actuator (Optional)

Electromechanical Control

The ECA monitors the mixed air temperature, ambient dry bulb temperature and local minimum position setpoint sensors, if selected, to control dampers to an accuracy of +/- 5% of stroke. The actuator is spring returned to the closed position any time that power is lost to the unit. It is capable of delivering up to 25 inch pounds of torque and is powered by 24 VAC.

ReliaTel™ Control

The ECA monitors the mixed air temperature, return air temperature, minimum position setpoint (local or remote), power exhaust setpoint, CO_2 setpoint, CO_2, and ambient dry bulb/enthalpy sensor or comparative humidity (return air humidity against ambient humidity) sensors, if selected, to control dampers to an accuracy of

+/- 5% of stroke. The actuator is spring returned to the closed position any time that power is lost to the unit. It is capable of delivering up to 25 inch pounds of torque and is powered by 24 VAC.

RTCI - ReliaTel™ Trane Communication Interface (Optional)

This module is used when the application calls for an ICSTM building management type control system. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or ordered as a kit to be field installed. Follow the installation instruction that ships with each kit when field installation is necessary.

RLCI - ReliaTel™ LonTalk Communication Interface (Optional)

This module is used when the application calls for an ICSTM building management type control system that is LonTalk. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or ordered as a kit to be field installed. Follow the installation instruction that ships with each kit when field installation is necessary.

RBCI - ReliaTel™ BACnet® Communications Interface (Optional)

This module is used when the application calls for an open BACnet protocol. It allows the control and monitoring of the system through an ICS panel. The module can be ordered from the factory or as a kit to be field installed. Follow the installation instructions that ships with each kit when field installation is necessary.

RTOM - ReliaTel™ Options Module (Standard on 17 Plus, 6 Ton(074), 7.5 Ton & 8.5 Ton High Efficiency with ReliaTel, 10 Ton with ReliaTel)

The RTOM monitors the supply fan proving, clogged filter, supply air temperature, exhaust fan setpoint, supply air tempering, Frostat™ , smoke detector, and Variable Speed Fan Control (17 Plus units only). Refer to system input devices and functions for operation.

System Input Devices & Functions

The RTRM must have a zone sensor or thermostat input in order to operate the unit. The flexibility of having several mode capabilities depends upon the type of zone sensor or thermostat selected to interface with the RTRM.

The descriptions of the following basic Input Devices used within the RTRM network are to acquaint the operator with their function as they interface with the various modules. Refer to the unit's electrical schematic for the specific module connections.

The following controls are available from the factory for field installation.

Supply Fan Failure Input (Optional)

The Fan Failure Switch can be connected to sense indoor fan operation:

FFS (Fan Failure Switch) If air flow through the unit is not proven by the differential pressure switch connected to the RTOM (factory set point 0.07 "w.c.) within 40 seconds nominally, the RTRM will shut off all mechanical operations, lock the system out, send a diagnostic to ICS, and the SERVICE output will flash. The system will remain locked out until a reset is initiated either manually or through ICS.

Clogged Filter Switch (Optional)

The unit mounted clogged filter switch monitors the pressure differential across the return air filters. It is mounted in the filter section and is connected to the RTOM. A diagnostic SERVICE signal is sent to the remote panel if the pressure differential across the filters is at least 0.5" w.c. The contacts will automatically open when the pressure differential across the filters decreases to approximately 0.4" w.c. The clogged filter output is energized when the supply fan is operating and the clogged filter switch has been closed for at least 2 minutes. The system will continue to operate regardless of the status of the filter switch.

Note: *On units equipped with factory installed MERV 13 filters, a clogged filter switch with different pressure settings will be installed. This switch will close when the differential pressure is approximately 0.8' w.c. and open when the differential falls to 0.7" w.c.*

Condensate Drain Pan Overflow Switch (Optional)

ReliaTel Option

This input incorporates the Condensate Overflow Switch (COF) mounted on the drain pan and the ReliaTel Options Module (RTOM). When the condensate level reaches the trip point for 6 continuous seconds, the RTOM will shut down all unit functions until the overflow condition has cleared. The unit will return to normal operation after 6 continuous seconds with the COF in a non-tripped condition. If the condensate level causes unit shutdown more than 2 times in a 3 days period, the unit will be locked-out of operation requiring manual reset of diagnostic system through Zone Sensor or Building Automation System (BAS). Cycling unit power will also clear the fault.

Electromechanical Option

This input incorporates the condensate overflow switch (COF), COF Relay, COF Time Delay. When the condensate level reaches the trip point, the COF relay energizes and opens the 24VAC control circuit which disables the unit. Once the 24VAC control circuit is opened, a delay timer will prevent unit start-up for three minutes.

General Information

Compressor Disable (CPR1/2)

This input incorporates the low pressure control (LPC) of each refrigeration circuit and can be activated by opening a field supplied contact installed on the LTB.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened for 1 continuous second during compressor operation, the compressor for that circuit is immediately turned "Off". The compressor will not be allowed to restart for a minimum of 3 minutes should the contacts close.

If four consecutive open conditions occur during the first three minutes of operation, the compressor for that circuit will be locked out, a diagnostic communicated to the remote panel (if installed), and a manual reset will be required to restart the compressor.

Low Pressure Control

ReliaTel™ Control

When the LPC is opened for 1 continuous second, the compressor for that circuit is turned off immediately. The compressor will not be allowed to restart for a minimum of 3 minutes.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic communicated to ICS™, if applicable, and a manual reset required to restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

Electromechanical Control

When the LPC is opened, the compressor for that circuit is turned off immediately. The compressor will restart when the LPC closes.

High Pressure Control

ReliaTel Control

The high pressure controls are wired in series between the compressor outputs on the RTRM and the compressor contactor coils. If the high pressure control switch opens, the RTRM senses a lack of current while calling for cooling and locks the compressor out.

If four consecutive open conditions occur during an active call for cooling, the compressor will be locked out, a diagnostic communicated to ICS™, if applicable, and a manual reset required to restart the compressor. On dual compressor units only the affected compressor circuit is locked out.

Electromechanical Control

When the HPC is opened, the compressor for that circuit is turned off immediately. The compressor will restart when the HPC closes.

Power Exhaust Control (Optional)

ReliaTel Control

The power exhaust fan is started whenever the position of the economizer dampers meets or exceed the power exhaust setpoint when the indoor fan is on.

With the optional ventilation override accessory, the power exhaust fan is independent of the indoor fan.

The setpoint panel is located in the return air section and is factory set at 25%.

Electromechanical Control

The power exhaust fan is started whenever the indoor fan is on and the adjustable damper limit switch DLS is closed.

Lead/Lag Control (Dual Circuit Only)

ReliaTel Control Only

Lead/Lag is a selectable input located on the RTRM. The RTRM is configured from the factory with the Lead/Lag control disabled. To activate the Lead/Lag function, simply cut the wire connected to J3-8 at the RTRM. When it is activated, each time the designated lead compressor is shut off due to the load being satisfied, the lead compressor or refrigeration circuit switches. When the RTRM is powered up, i.e. after a power failure, the control will default to the number one circuit compressor. Lead/Lag is not available on Multi-Speed Indoor Fan, or Single Zone Variable Air Volume (SZVAV) products.

Zone Sensor Module (ZSM) (BAYSENS106*)

This electronic sensor features three system switch settings (Heat, Cool, and Off) and two fan settings (On and Auto). It is a manual changeover control with single setpoint. (Cooling Setpoint Only)

Zone Sensor Module (ZSM) (BAYSENS108*)

This electronic sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto). It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS077*.

Zone Sensor (BAYSENS110*)

This electronic sensor features four system switch settings (Heat, Cool, Auto, and Off) and two fan settings (On and Auto) with four system status LED's. It is a manual or auto changeover control with dual setpoint capability. It can be used with a remote zone temperature sensor BAYSENS077*.

Wall Mounted Relative Humidity Sensor (BAYSENS036*)

Field installed, wall mounted humidity sensor is used to control activation of Enhanced Dehumidification and the Hot Gas Reheat Dehumidification options. Humidity set points can be selected for relative humidity levels between

40% and 60% by adjusting the DEHUMID setting on the ReliaTel Options Module. See Figure 58, p. 38.

Duct Mounted Relative Humidity Sensor (BAYSENS037*)

Field installed, duct mounted humidity sensor is used to control activation of Enhanced Dehumidification and the hot gas reheat dehumidification options. Humidity set points can be selected for relative humidity levels between 40% and 60% by adjusting the DEHUMID setting on the ReliaTel Options Module. See Figure 58, p. 38.

Programmable Zone Sensor - (BAYSENS119*)

This 7 day programmable sensor features 2, 3 or 4 periods for Occupied or Unoccupied programming per day. If the power is interrupted, the program is retained in permanent memory. If power is off for an extended period of time, only the clock and day may have to be reset.

The Zone Sensor allows selection of 2, 3 or 4 system modes (Heat, Cool, Auto, and Off), two fan modes (On and Auto). It has dual temperature selection with programmable start time capability.

The occupied cooling set point ranges between 45 and 98 ° F. The heating set point ranges between 43 and 96°F.

A liquid crystal display (LCD) displays zone temperature, temperature set points, day of the week, time, and operational mode symbols.

The Option Menu is used to enable or disable applicable functions, i.e.; Morning Warm-up, Economizer minimum position override during unoccupied status, Fahrenheit or Centigrade, Supply air tempering, Remote zone temperature sensor, 12/24 hour time display, Smart fan, and Computed recovery.

During an occupied period, an auxiliary relay rated for 1.25 amps @ 30 volts AC with one set of single pole double throw contacts is activated.

Status Inputs (4 Wires Optional)

The ZSM can be wired to receive four (4) operating status signals from the RTRM (HEAT, COOL, SYSTEM “ON”, SERVICE).

Four (4) wires from the RTRM should be connected to the appropriate terminals (7, 8, 9 & 10) on the ZSM.

Remote Zone Sensor (BAYSENS073*)

This electronic sensor features remote zone sensing and timed override with override cancellation. It is used with a Trane Integrated Comfort™ building management system.

Remote Zone Sensor (BAYSENS074*)

This electronic sensor features single setpoint capability and timed override with override cancellation. It is used with a Trane Integrated Comfort™ building management system.

Remote Zone Sensor (BAYSENS016*)

This bullet type temperature sensor can be used for outside air (ambient) sensing, return air temperature sensing, supply air temperature sensing, remote temperature sensing (uncovered). Wiring procedures vary according to the particular application and equipment involved. Refer to the unit’s wiring diagrams for proper connections.

Remote Zone Sensor (BAYSENS077*)

This electronic sensor can be used with BAYSENS106*, 108*, 110*, 119* Remote Panels. When this sensor is wired to a BAYSENS119* Remote Panel, wiring must be 18 AWG Shielded Twisted Pair (Belden 8760 or equivalent). Refer to the specific Remote Panel for wiring details.

Wireless Zone Sensor (BAYSENS050)

This electronic sensor features five system settings (Auto, Off, Cool, Heat, and Emergency Heat) and with On and Auto fan settings. It is a manual or auto changeover control with dual setpoint capability. Other features include a timed override function, lockable system settings, and Fahrenheit or Celsius temperature display. Included with the wireless zone sensor will be a receiver that is to be mounted inside the unit, a mounting bracket, and a wire harness.

Electromechanical Control

The unit must have a thermostat to operate.

- BAYSTAT151
  - Single Stage - 1 Heat/1 Cool
- BAYSTAT155
  - Multi Stage - 3 Heat/2 Cool - Can be Used for Economizer Operation
- BAYSENS150
  - Multi stage - 3 Heat/2 Cool Programmable Thermostat

High Temperature Sensor (BAYFRST001*)

This sensor connects to the RTRM Emergency Stop Input on the LTB and provides high limit “shutdown” of the unit. The sensor is used to detect high temperatures due to a high thermal event in the air conditioning or ventilation ducts. The sensor is designed to mount directly to the sheet metal duct. Each kit contains two sensors. The return air duct sensor (X1310004001) is set to open at 135°F. The supply air duct sensor (X1310004002) is set to open at 240°F. The control can be reset after the temperature has been lowered approximately 25°F below the cutout setpoint.

Evaporator Frost Control

ReliaTel™ Option

This input incorporates the Frostat™ control (FOS) mounted in the indoor coil circuit and can be activated by

General Information

closing a field supplied contact installed in parallel with the FOS.

If this circuit is closed before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is closed for 1 continuous second during compressor operation, the compressor for that circuit is immediately turned "Off". The compressor will not be allowed to restart for a minimum of 3 minutes should the FOS open.

Frostat is standard on multi-speed indoor motors and single zone VAV products (SZVAV).

Electromechanical Option

This input incorporates the Frostat™ control (FOS) mounted in the indoor coil circuit or on suction line before equalizer port of TXV and can be activated by opening a field supplied contact installed in series with the FOS.

If this circuit is open before the compressor is started, the compressor will not be allowed to operate. Anytime this circuit is opened during compressor operation, the compressor for that circuit is immediately turned "Off". The compressor will restart when the FOS closes. Frostat™ is standard on TSC036G-060G electromechanical control products.

Discharge Line Temp Switch (DLTS)

The DLTS is looped in series with HPC and LPC. It prevents compressor from overheating (over 300°F dome temp) in case of indoor fan failure (cooling) or outdoor fan failure (heating).

Smoke Detector Sensor (Optional)

This sensor provides high limit "shutdown" of the unit and requires a manual reset. The sensor is used to detect smoke in the air conditioning or ventilation ducts.

Notes:

- *The supply air smoke detector samples supply air. The return and plenum air smoke detectors sample return air. The smoke detectors are designed to shut off the unit if smoke is sensed. This function is performed by sampling the airflow entering the unit at the return air opening. Follow the instructions provided below to assure that the airflow through the unit is sufficient for adequate sampling. Failure to follow these instructions will prevent the smoke detectors from performing its design function.*
- *Airflow through the unit is affected by the amount of dirt and debris accumulated on the indoor coil and filters. To insure that airflow through the unit is adequate for proper sampling by the return air smoke detector, complete adherence to the maintenance procedures, including recommended intervals between filter changes, and coil cleaning is required.*
- *Periodic checks and maintenance procedures must be performed on the smoke detector to insure that it will function properly. For detailed instructions concerning these checks and procedures, refer to the appropriate section(s) of the smoke detector Installation and Maintenance Instructions provided with the literature package for this unit.*

In order for the supply air smoke detector or return air smoke detector to properly sense smoke in the supply air stream or return air stream, the air velocity entering the smoke detector unit must be between 500 and 4000 feet per minute. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance tables.

Phase Monitor

This sensor monitors voltage between the 3 conductors of the 3 phase power supply. Two LED lights are provided:

- The green light indicates that a balanced 3 phase supply circuit is properly connected.
- The red light indicates that unit operation has been prevented. There are two conditions that will prevent unit operation:
  - The power supply circuit is not balanced with the proper phase sequence of L1, L2, L3 for the 3 conductors of a 3 phase circuit.
  - The line to line voltage is not between 180 volts and 633 volts.

Single Zone Variable Air Volume / Displacement Ventilation (Optional)

This sensor offers full supply fan modulation across the available airflow range. In addition to full supply fan modulation, the unit controls the discharge air temperature to a varying discharge air temperature setpoint in order to maintain Space Temperature.

Human Interface - 5 Inch Color Touchscreen (Optional)

The 5 inch Color Touchscreen Human Interface provides an intuitive user interface to the rooftop unit that speeds up unit commissioning, shortens unit troubleshooting times, and enhances preventative maintenance measures. The human interface includes several features including:

- Data trending capabilities by means of time series graphs
- Historical alarm messages
- Real-time sensor measurements
- On board system setpoints
- USB port that enables the downloading of component runtime information as well as trended historical sensor data
- Customized reports

Installation

Pre-Installation

⚠WARNING

Fiberglass Wool!

Exposition to glass wool fibers without all necessary PPE equipment could result in cancer, respiratory, skin or eye irritation, which could result in death or serious injury. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation. You MUST wear all necessary Personal Protective Equipment (PPE) including gloves, eye protection, a NIOSH approved dust/mist respirator, long sleeves and pants when working with products containing fiberglass wool.

Precautionary Measures

- Avoid breathing fiberglass dust.
- Use a NIOSH approved dust/mist respirator.
- Avoid contact with the skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves, and eye protection.
- Wash clothes separately from other clothing: rinse washer thoroughly.
- Operations such as sawing, blowing, tear-out, and spraying may generate fiber concentrations requiring additional respiratory protection. Use the appropriate NIOSH approved respiration in these situations.

First Aid Measures

Eye Contact - Flush eyes with water to remove dust. If symptoms persist, seek medical attention.

Skin Contact - Wash affected areas gently with soap and warm water after handling.

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

Remove power to the unit and gain access to the electric heat elements by removing the horizontal supply cover. Visually inspect the heater elements for the following:

1. Elements that are no longer secured to the white ceramic insulator.
2. Elements touching each other or touching metal.
3. Severely kinked, drooping, or broken elements.

If an element has detached from its ceramic insulator, carefully put it back into place.

Replace the heater elements if they present symptoms noted in item Step 2 or Step 3 above.

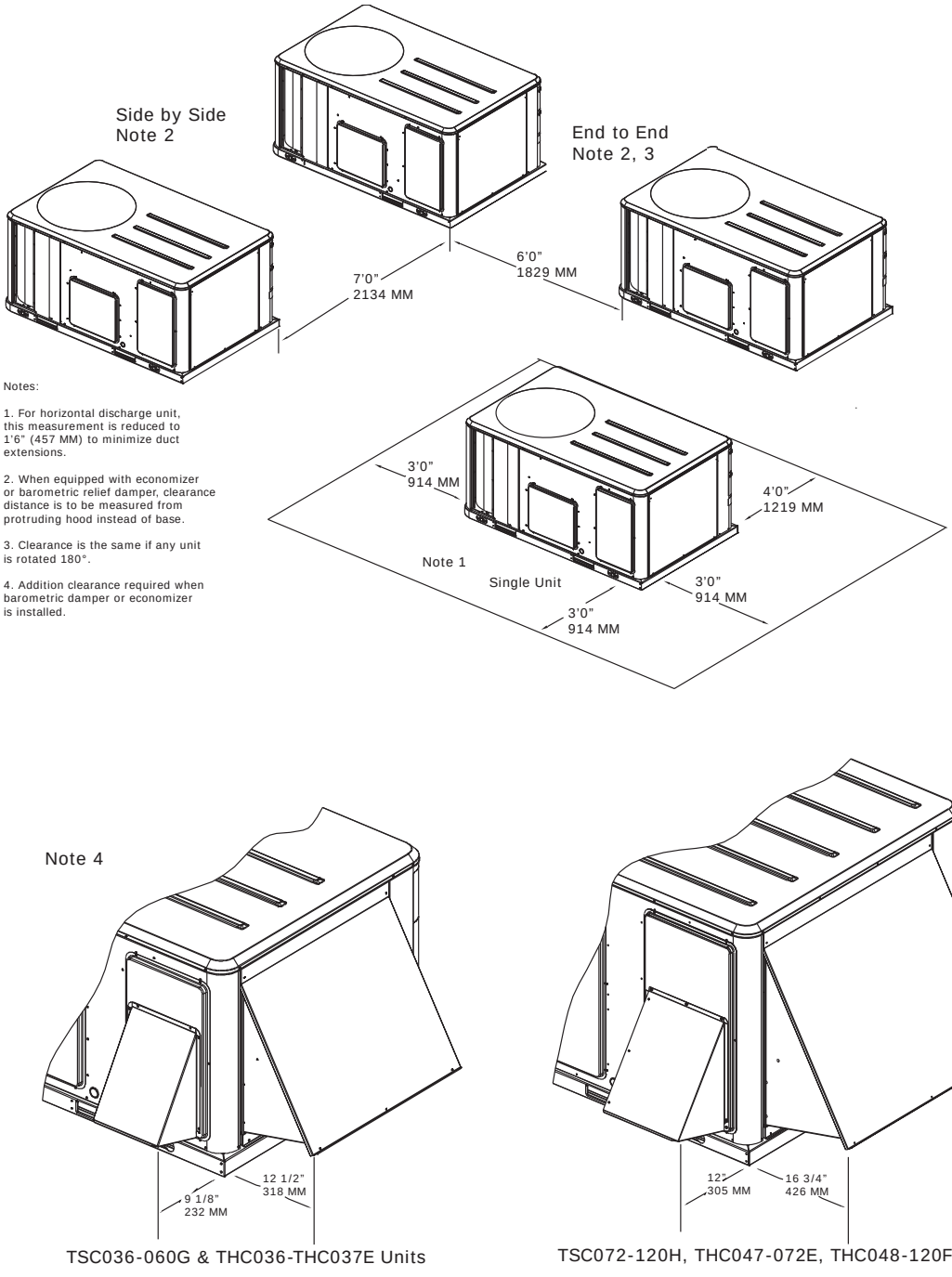
Dimensions and Weights

Unit Clearances

Figure 1, p. 18 illustrates the minimum operating and service clearances for either a single or multiple unit installation. These clearances are the minimum distances necessary to assure adequate serviceability, cataloged unit capacity, and peak operating efficiency.

Providing less than the recommended clearances may result in condenser coil starvation, “short-circuiting” of exhaust and economizer airflows, or recirculation of hot condenser air.

Figure 1. Typical installation clearances for single & multiple unit applications



⚠WARNING

Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

⚠WARNING

Improper Unit Lift!

Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

Figure 2. Corner weights

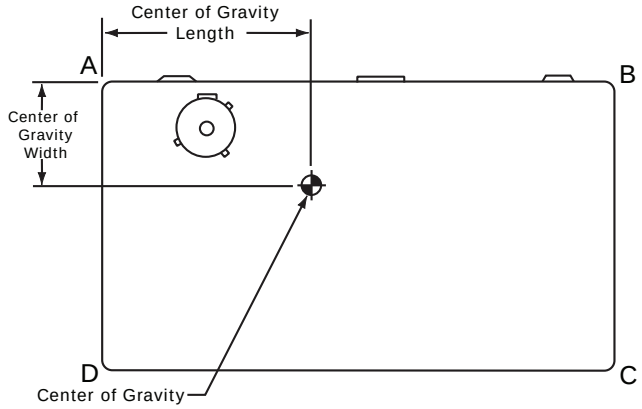


Table 3. Maximum unit & corner weights (lbs) and center of gravity dimensions (in.) - cooling models

Tons	Unit Model No.	Maximum Model Weights[a]		Corner Weights[b]				Center of Gravity (in.)	
		Shipping	Net	A	B	C	D	Length	Width
3	TSC036G	537	431	201	155	25	50	29	8
4	TSC048G	557	452	213	159	27	53	29	8
5	TSC060G	603	498	218	140	50	90	27	12
6	TSC072H	762	667	218	186	131	132	44	21
7.5	TSC090H	772	679	186	217	106	170	34	21
7.5	TSC092H	940	797	249	235	163	149	46	21
8.5	TSC102H	938	837	273	222	183	159	47	22
10	TSC120H	1058	960	320	218	233	189	40	24
3	THC036E	555	481	157	122	95	107	31	19
4	THC048E	787	692	220	178	132	163	40	23
4	THC048F	737	642	208	177	128	130	44	22
5	THC060E	841	746	241	193	139	173	39	22
5	THC060F	774	679	219	189	135	137	43	21
6	THC072E	943	845	274	172	186	213	41	24
6	THC072F	883	740	228	219	155	138	47	21
6	THC074F	1016	918	309	207	223	178	40	24
7.5	THC092F	1026	928	315	209	224	180	40	24
8.5	THC102F	1035	937	316	212	227	181	49	24
10	THC120F	1326	1132	326	326	258	222	53	27

(a) Weights are approximate.
(b) Corner weights are given for information only.

Dimensions and Weights

Figure 3. Rigging and center of gravity

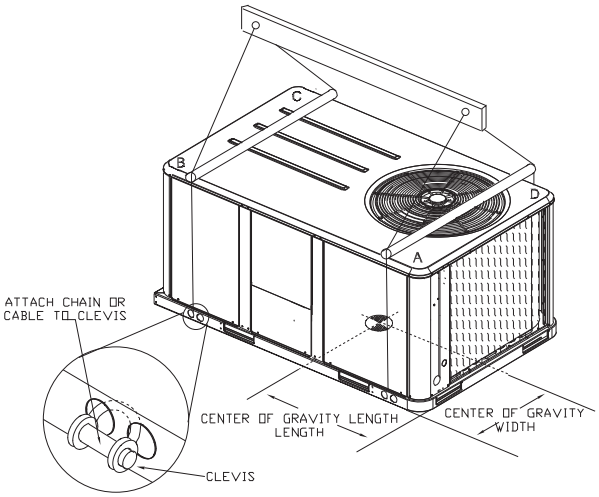
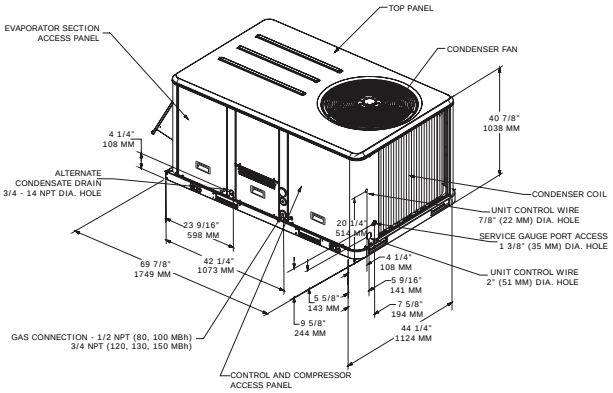


Table 4. Factory installed options (fiops)/accessory net weights (lbs)[a],[b]

Accessory	TSC036G-060G THC036E, THC037E Net Weight 3 to 5 Tons	THC047E-067E THC048E-060E THC048F-060F Net Weight 4 to 5 Tons	TSC072H-102H THC072E/F Net Weight 6 to 8.5 Tons	TSC120H THC074F-102F Net Weight 6, 7.5, 8.5, 10	THC120F Net Weight 10
Barometric Relief	7	10	10	10	10
Belt Drive Option (3 phase only)	31	31	—	—	—
Coil Guards	12	20	20	20	30
Economizer	26	36	36	36	36
Electric Heaters[c]	15	30	31	44	50
Hinged Doors	10	12	12	12	12
Low Leak Economizer	68	93	93	93	93
Manual Outside Air Damper	16	26	26	26	26
Motorized Outside Air Damper	20	30	30	30	30
Novar Control	8	8	8	8	8
Oversized Motor	5	8	8	—	—
Powered Convenience Outlet	38	38	38	38	50
Powered Exhaust	40	40	80	80	80
Reheat Coil	12[d]	14	15	20[e]	30
Roof Curb	61	78	78	78	89
Smoke Detector, Supply	5	5	5	5	5
Smoke Detector, Return	7	7	7	7	7
Through-the-Base Electrical	8	13	13	13	13
Through-the-Base Gas	5	5	5	5	5
Unit Mounted Circuit Breaker	5	5	5	5	5
Unit Mounted Disconnect	5	5	5	5	5
460V/575V[f]	29	29	—	—	—

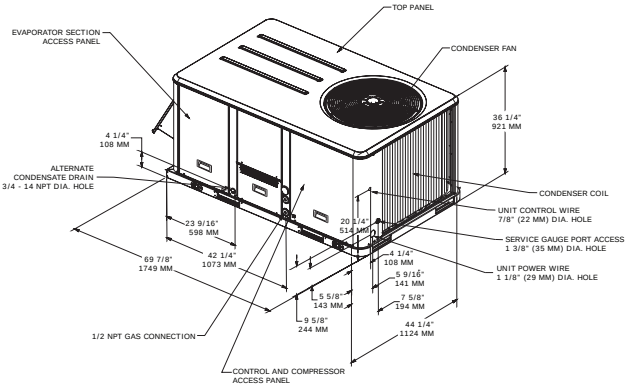
(a) Weights for options not listed are <5 lbs.
(b) Net weight should be added to unit weight when ordering factory-installed accessories.
(c) Applicable to cooling units only.
(d) Reheat weight here is only applicable to THC036E models.
(e) Reheat weight for this value only applicable to 7.5 and 8.5 Ton High Efficiency “F” models.
(f) Apply weight with all 460V and 575V 17 Plus Two-Stage Cooling units.

Figure 4. Cooling and gas/electric — 3 to 5 tons standard efficiency[a],[b]



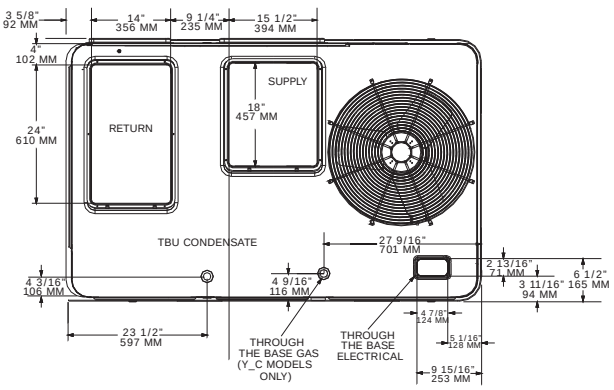
(a) All dimensions are in inches/millimeters.
(b) 1/2 NPT or 3/4 NPT gas connection = (Y_C models only); 2" electrical connection: single point power when heat installed (T_C models only)

Figure 5. Cooling and gas/electric - 3 tons high efficiency[a],[b]



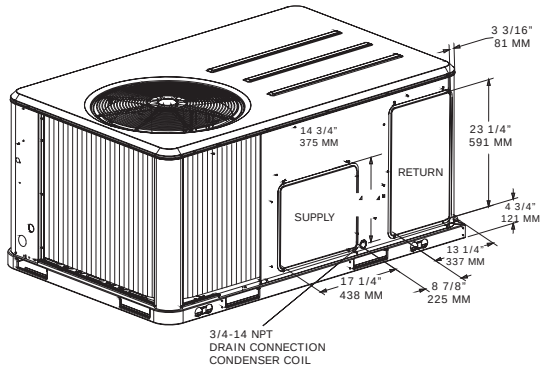
(a) All dimensions are in inches/millimeters.
(b) 1/2 NPT gas connection = (Y_C models only); 2" electrical connection: single point power when heat installed (T_C models only)

Figure 6. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency downflow airflow supply/return— through-the-base utilities[a]



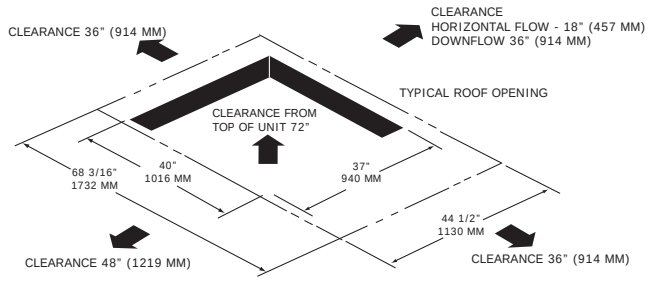
(a) All dimensions are in inches/millimeters.

Figure 7. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency— horizontal airflow supply/return[a]



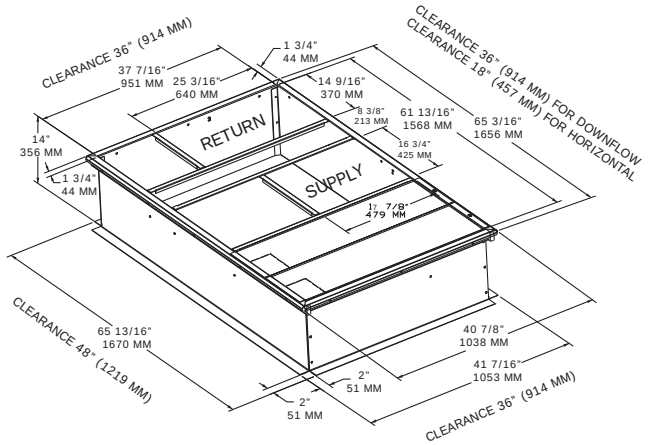
(a) All dimensions are in inches/millimeters.

Figure 8. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency— unit clearance and roof opening[a]



(a) All dimensions are in inches/millimeters.

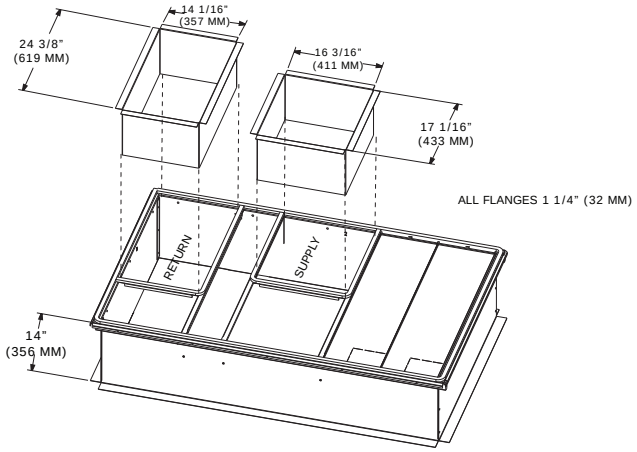
Figure 9. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency— roof curb[a]



(a) All dimensions are in inches/millimeters.

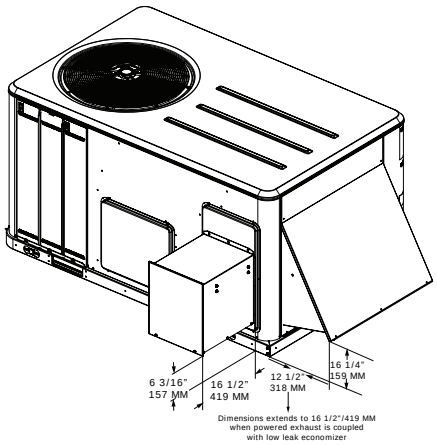
Dimensions and Weights

Figure 10. Cooling and gas/electric —3 to 5 standard efficiency, 3 tons high efficiency — downflow duct connections, field fabricated[a]



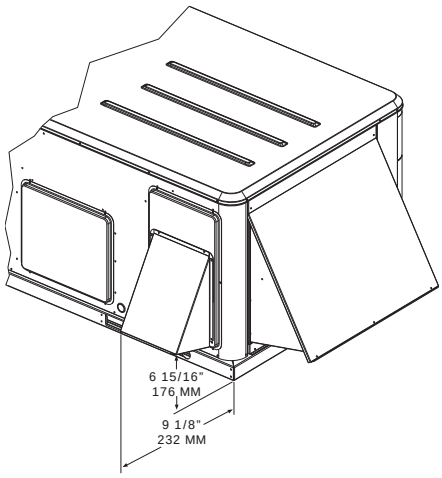
(a) All dimensions are in inches/millimeters.

Figure 11. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency— economizer, manual or motorized fresh air damper, power exhaust[a]



(a) All dimensions are in inches/millimeters.

Figure 12. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency— economizer & barometric relief damper hood[a]



(a) All dimensions are in inches/millimeters.

Figure 13. Cooling and gas/electric —3 to 5 tons standard efficiency, 3 tons high efficiency— swing diameter for hinged door(s) option

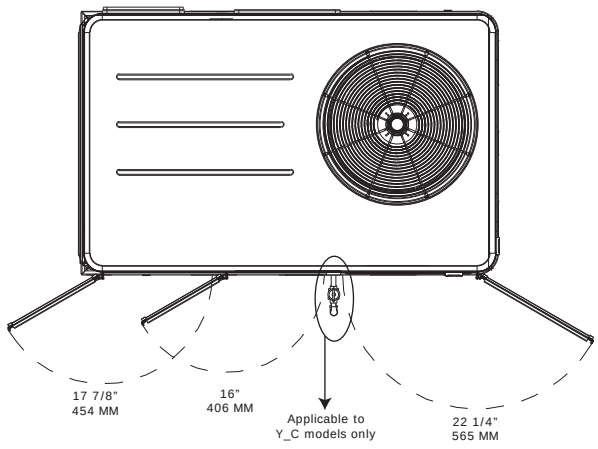
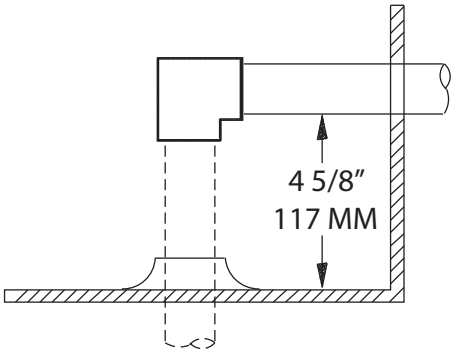
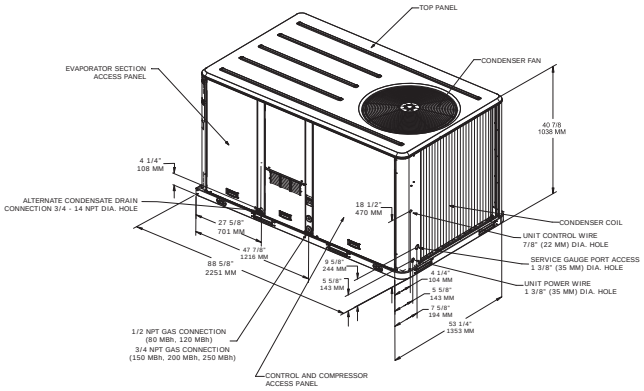


Figure 14. Gas/electric – 3 to 10 tons standard and high efficiency— gas pipe height (Y models only)[a],[b]



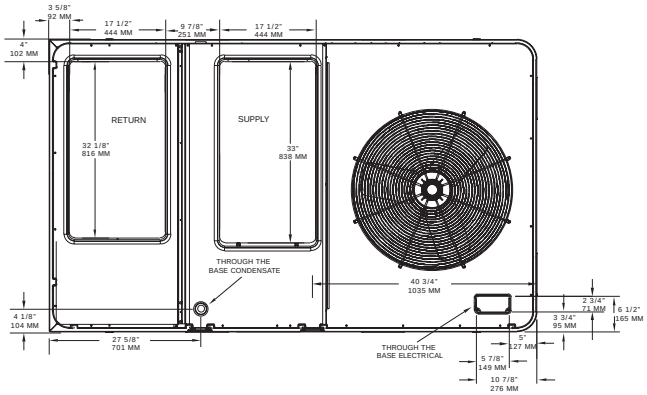
(a) All dimensions are in inches/millimeters.
(b) Height of gas pipe required from inside unit base to gas shut off assembly (factory provided)

Figure 15. Cooling and gas/electric —6, 7.5 (single) tons standard efficiency, 4 to 5 tons high efficiency[(a)]



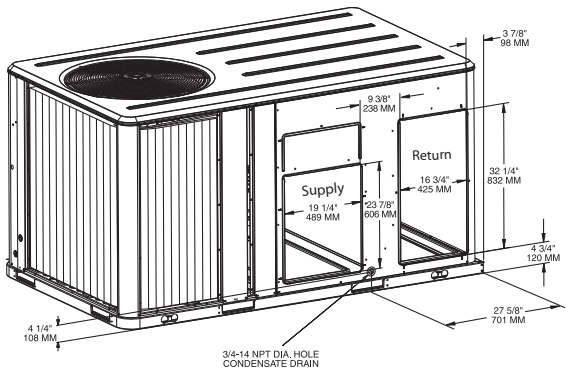
(a) All dimensions are in inches/millimeters.

Figure 16. Cooling and gas/electric — 6 to 10 tons standard efficiency, 4 to 8.5 tons high efficiency—downflow airflow supply/return, through-the-base utilities[(a)]



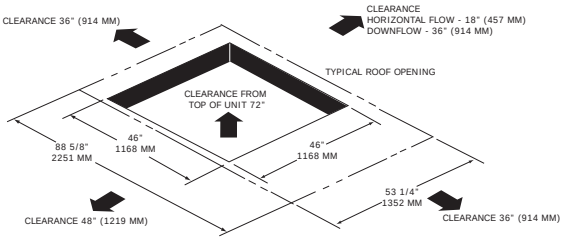
(a) All dimensions are in inches/millimeters.

Figure 17. Cooling and gas/electric — 6 to 10 ton standard efficiency units, 4 to 6 ton high efficiency units, 6(074)-8.5 (microchannel) high efficiency unit—horizontal airflow supply/return[(a)]



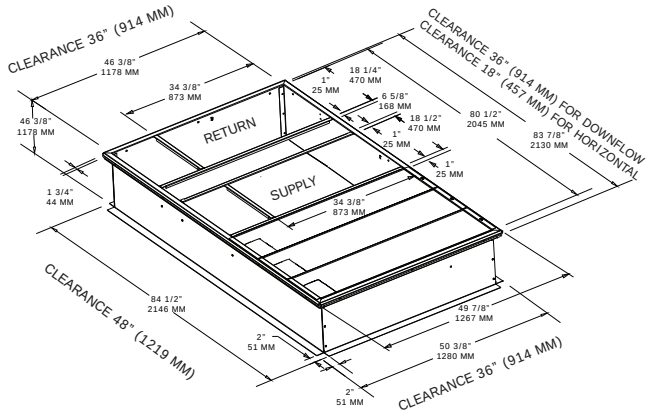
(a) All dimensions are in inches/millimeters.

Figure 18. Cooling and gas/electric —6 to 10 tons standard efficiency, 4 to 8.5 tons high efficiency— unit clearance and roof opening[(a)]



(a) All dimensions are in inches/millimeters.

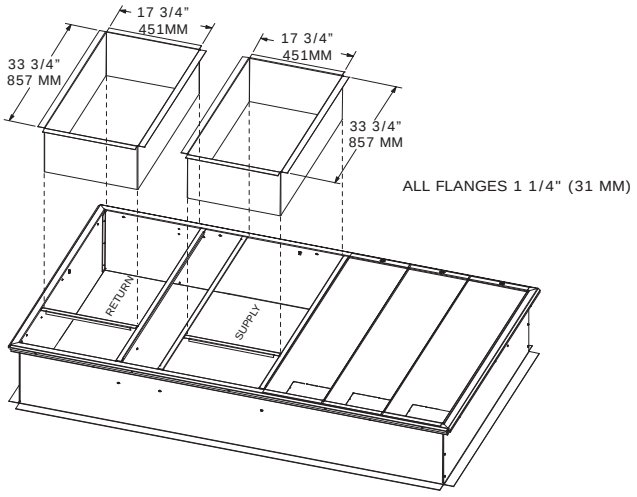
Figure 19. Cooling and gas/electric —6 to 10 tons standard efficiency, 4 to 8.5 tons high efficiency— roof curb[(a)]



(a) All dimensions are in inches/millimeters.

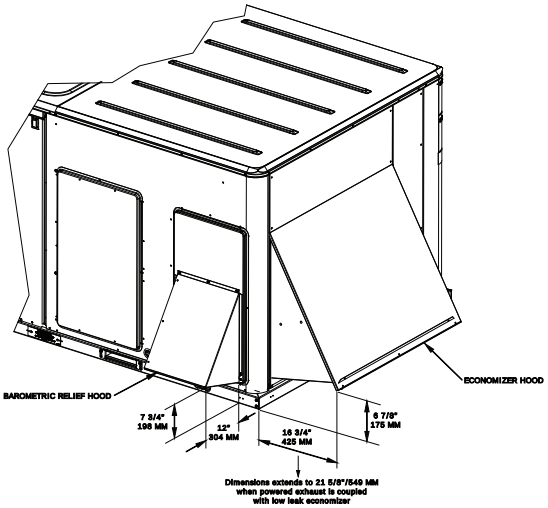
Dimensions and Weights

Figure 20. Cooling and gas/electric —6 to 10 tons standard efficiency, 4 to 10 tons high efficiency— downflow duct connections, field fabricated[a],[b],[c]



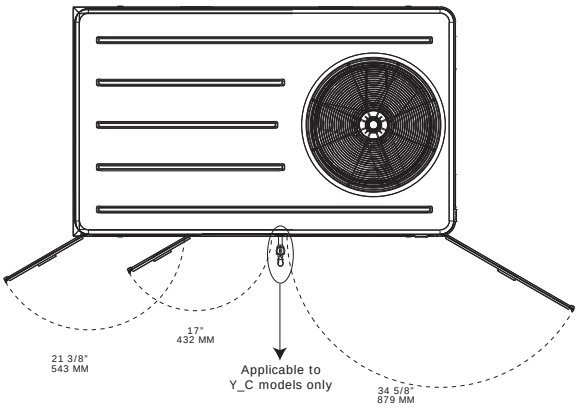
(a) All dimensions are in inches/millimeters.
(b) Reference duct clearance to combustible materials in this chapter.
(c) 1/2 or 3/4 NPT gas connection = (Y_C models only); 2" electrical connection: single point power when heat installed (T_C models only)

Figure 21. Cooling and gas/electric —6 to 10 tons standard efficiency, 4 to 10 tons high efficiency— economizer, manual or motorized fresh air damper[a]



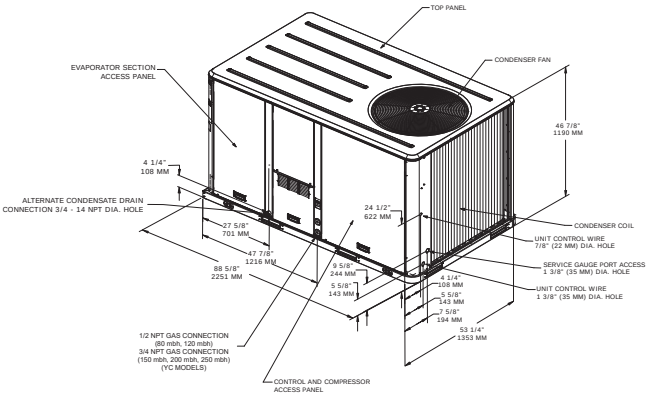
(a) All dimensions are in inches/millimeters.

Figure 22. Cooling and gas/electric —6 to 10 tons standard efficiency, 4 to 8.5 tons high efficiency— swing diameter for hinged door(s) option[a]



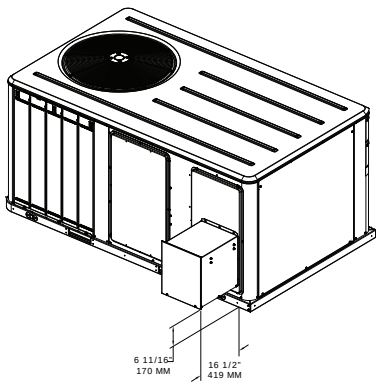
(a) All dimensions are in inches/millimeters.

Figure 23. Cooling and gas/electric —7.5 tons (dual compressor standard efficiency) to 10 tons standard efficiency, 6 to 8.5 tons high efficiency[a]



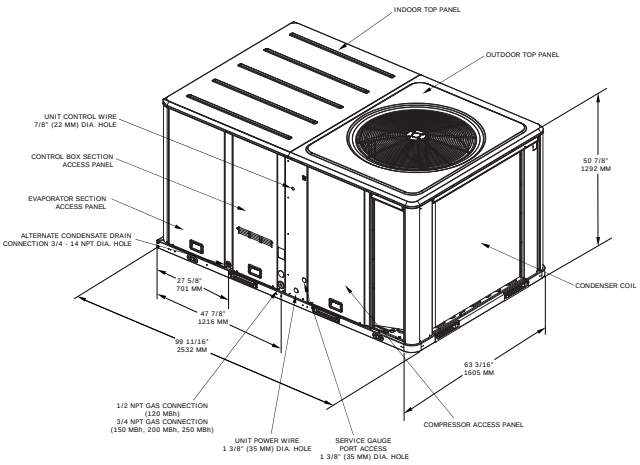
(a) All dimensions are in inches/millimeters.

Figure 24. Cooling and gas/electric —7.5 tons (dual compressor standard efficiency) to 10 tons standard efficiency, 6 to 8.5 tons high efficiency— power exhaust[a]



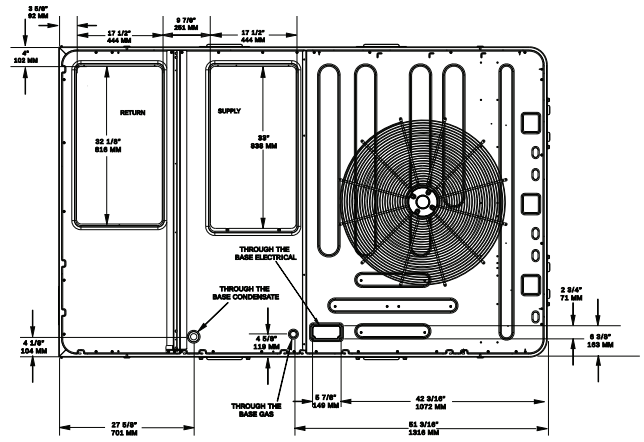
(a) All dimensions are in inches/millimeters.

Figure 25. Cooling and gas/electric —10 tons high efficiency[(a)]



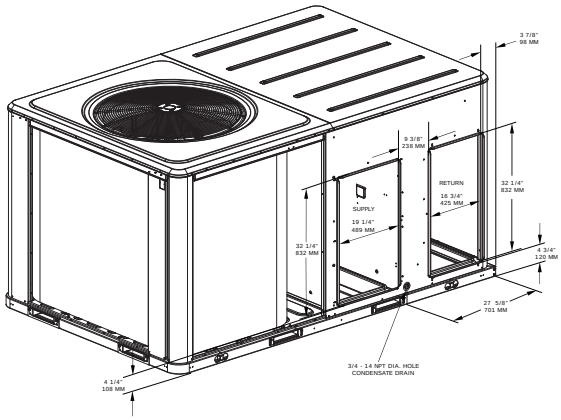
(a) All dimensions are in inches/millimeters.

Figure 26. Cooling and gas/electric —10 tons high efficiency— downflow airflow supply/return, through-the-base utilities[(a)]



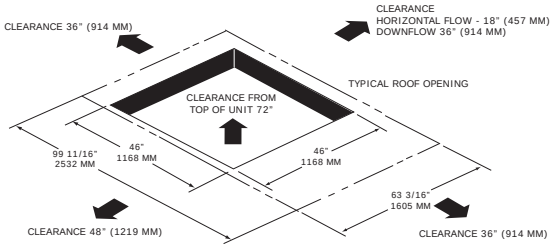
(a) All dimensions are in inches/millimeters.

Figure 27. Cooling and gas/electric —10 tons high efficiency— horizontal airflow, supply and return[(a)]



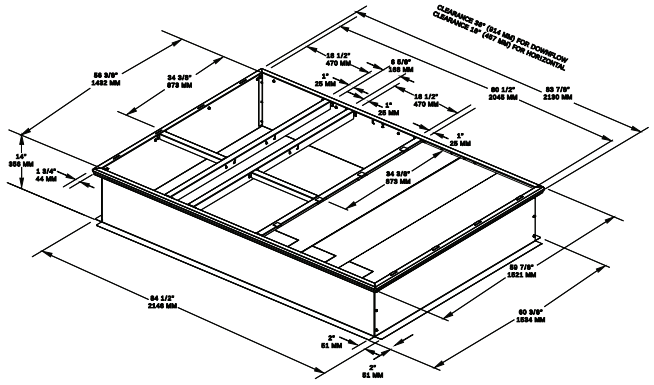
(a) All dimensions are in inches/millimeters.

Figure 28. Cooling and gas/electric —10 tons high efficiency— unit clearance and roof opening[(a)]



(a) All dimensions are in inches/millimeters.

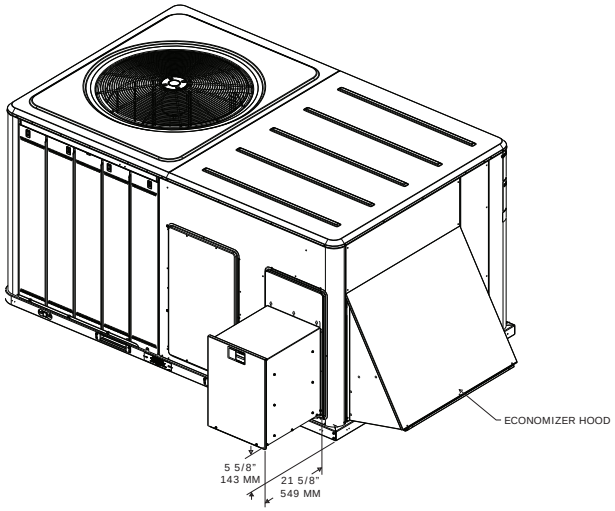
Figure 29. Cooling and gas/electric —10 tons high efficiency— roof curb[(a)]



(a) All dimensions are in inches/millimeters.

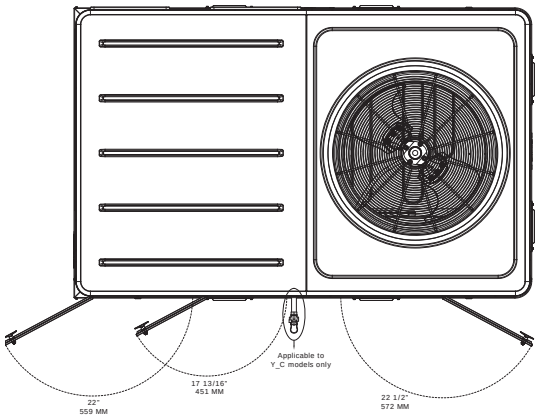
Dimensions and Weights

Figure 30. Cooling and gas/electric —10 tons high efficiency— power exhaust[a]



(a) All dimensions are in inches/millimeters.

Figure 31. Cooling and gas/electric —10 tons high efficiency— swing diameter for hinged door(s) option[a]



(a) All dimensions are in inches/millimeters.

Installation

Foundation

⚠WARNING

Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

Horizontal Units

If the unit is installed at ground level, elevate it above the snow line. Provide concrete footings at each support location with a "full perimeter" support structure or a slab foundation for support. Refer to the weights information in the Dimensions and Weights chapter for the unit's operating and point loading weights when constructing a footing foundation.

If anchoring is required, anchor the unit to the slab using hold down bolts or isolators. Isolators should be installed to minimize the transmission of vibrations into the building.

⚠WARNING

Risk of Roof Collapsing!

Failure to ensure proper structural roof support could cause the roof to collapse, which could result in death or serious injury and property damage. Confirm with a structural engineer that the roof structure is strong enough to support the combined weight of the roofcurb and the unit. Refer to the weights section for typical unit and curb weights.

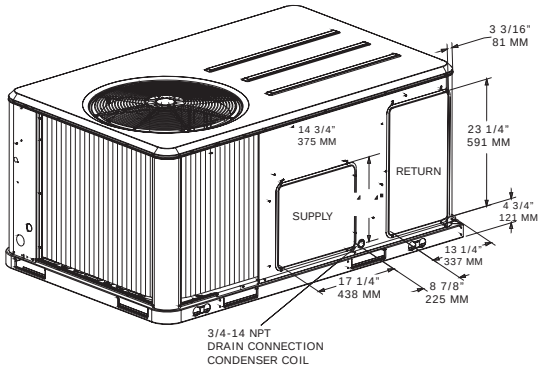
For rooftop applications, ensure the roof is strong enough to support the combined unit and support structural weight.Refer to maximum unit and corner weights (center of gravity) dimensions in the Dimensions and Weights section for the unit operating weights. If anchoring is required, anchor the unit to the roof with hold-down bolts or isolators.

Check with a roofing contractor for proper waterproofing procedures.

Ductwork

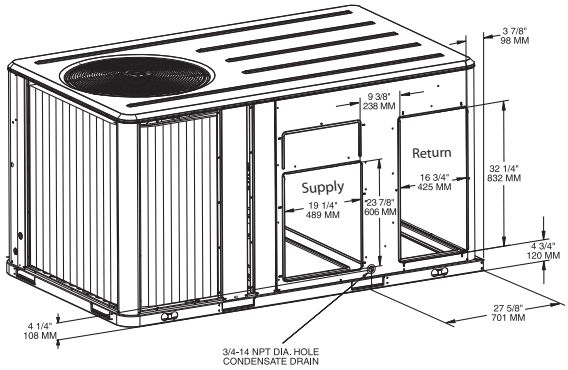
Supply and return air openings as viewed from the rear of the unit are shown in the following drawings.

Figure 32. Cooling and gas/electric — 3 to 5 tons standard efficiency, 3 tons high efficiency— horizontal airflow supply/return[(a)]



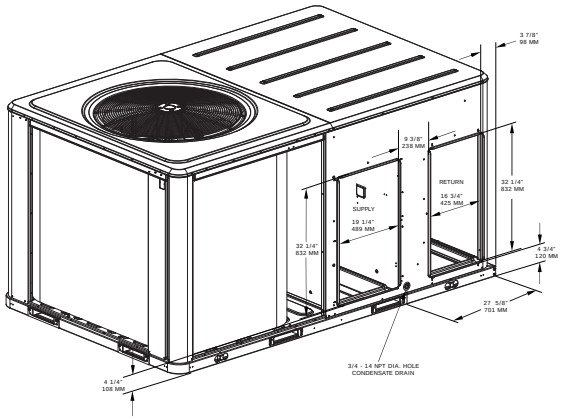
(a) All dimensions are in inches/millimeters.

Figure 33. Cooling and gas/electric — 6-10 ton standard efficiency units, 4 to 6 ton high efficiency units, 6(074)-8½ (Microchannel) high efficiency unit—horizontal airflow supply/return[(a)]



(a) All dimensions are in inches/millimeters.

Figure 34. Cooling and gas/electric —10 tons high efficiency— horizontal airflow, supply and return[(a)]



(a) All dimensions are in inches/millimeters.

Installation

Supply and return air openings as viewed from a downflow configuration are shown in the following drawings.

Elbows with turning vanes or splitters are recommended to minimize air noise due to turbulence and to reduce static pressure.

When attaching the ductwork to the unit, provide a water tight flexible connector at the unit to prevent operating sounds from transmitting through the ductwork.

All outdoor ductwork between the unit and the structure should be weather proofed after installation is completed.

Figure 35. 3 to 5 ton standard efficiency units & 3 ton high efficiency units - downflow supply & return air openings w/ through-the-base utilities

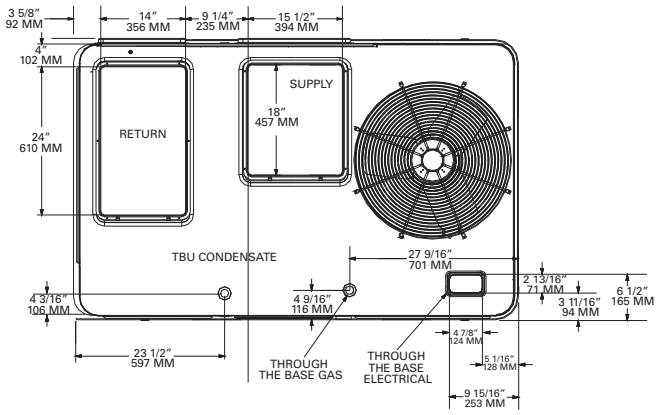


Figure 36. 4 to 6 ton high efficiency units, 6(074)-8.5 (Microchannel) high efficiency units and 6 to 10 ton standard efficiency units - down flow supply & return air openings w/ through-the-base utilities

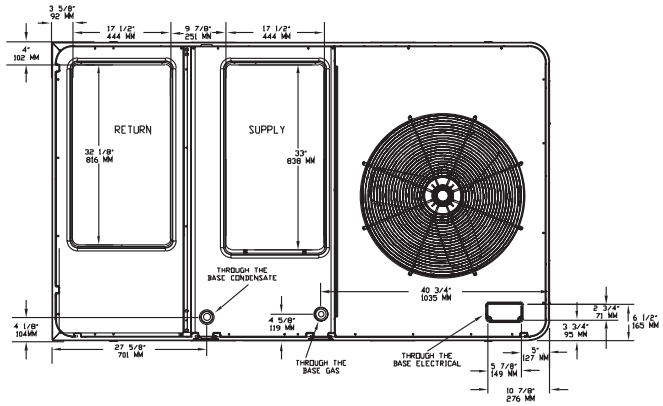


Figure 37. 10 ton high efficiency unit - downflow supply & return air openings w/ through-the-base utilities

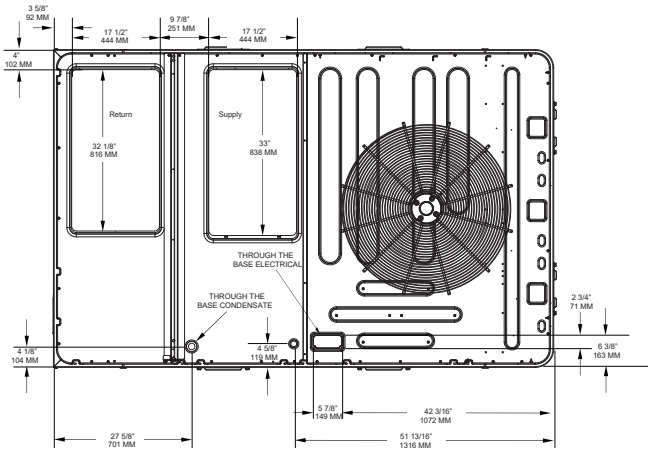


Table 5. Clearance required from duct to combustible surfaces

Model Number	Clearance required from duct to combustible surfaces (inches)
TSC0(36-60)G	0
THC036E,F	0
THC037-67E	0
TSC072H	0
THC072E/F	1
TSC090H	1
TSC092H	0
THC074F	1
THC092F	1
TSC102H	0
THC102F	1
TSC120H	1
THC120F	1

Roof Curb

The roof curbs for these units consists of a “full perimeter” enclosure to support the unit just inside of the unit base rail. The 10 ton high efficiency units contains a support base alignment rail and will extend past the end of the roof curb as shown in figures below and to the right.

Before installing any roof curb, verify;

- It is the correct curb for the unit,
- The includes the necessary gaskets and hardware,
- The purposed installation location provides the required clearance for proper operation,
- Insure that the curb is level and square. The top surface of the curb must be true to assure an adequate curb-to-unit seal.

⚠WARNING

Combustible Materials!

Failure to maintain proper clearance between the unit heat exchanger, vent surfaces and combustible materials could cause a fire which could result in death or serious injury or property damage. Refer to unit nameplate and installation instructions for proper clearances.

Verify that appropriate materials were used in the construction of roof and ductwork. Combustible materials should not be used in the construction of ductwork or roof curb that is in close proximity to heater elements or any hot surface. Any combustible material on the inside of the unit base should be removed and replaced with appropriate material.

Step-by-step curb assembly and installation instructions ship with each accessory roof curb kit. Follow the instructions carefully to assure proper fit-up when the unit is set into place.

Note: *To assure proper condensate flow during operation, the unit (and curb) must be level.*

If the unit is elevated, a field constructed catwalk around the unit is strongly recommended to provide easy access for unit maintenance and service.

Recommendations for installing the Supply Air and Return Air ductwork joining the roof curb are included in the curb instruction booklet. Curb ductwork must be fabricated and installed by the installing contractor before the unit is set into place.

Note: *For sound consideration, cut only the holes in the roof deck for the ductwork penetrations. Do not cut out the entire roof deck within the curb perimeter.*

Figure 38. View for base to roof curb alignment THC120F on 50" x 84" roof curb

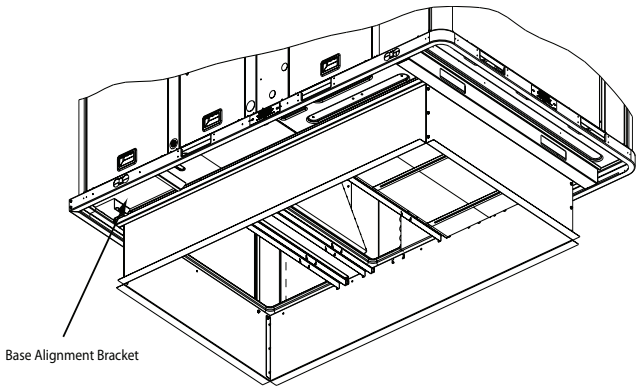
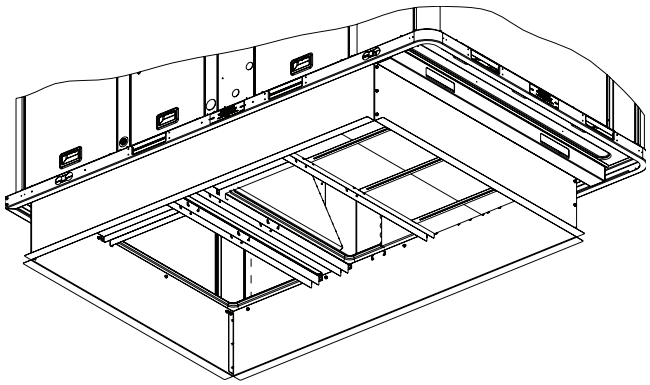


Figure 39. View for base to roof curb alignment THC120F on 60" x 84" roof curb



If a Curb Accessory Kit is not used:

- The ductwork can be attached directly to the factory-provided flanges around the unit's supply and return air openings. Be sure to use flexible duct connections at the unit.
- For "built-up" curbs supplied by others, gaskets must be installed around the curb perimeter flange and the supply and return air opening flanges.

Rigging

⚠WARNING

Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift.

A rigging illustration and center-of-gravity dimensional data table is shown in the weights section. Refer to the typical unit operating weights table before proceeding.

1. Remove all drill screws fastening wood protection to metal base rail. Remove all screws securing wooden protection to wooden top crate.

   On 6-10 ton high efficiency units, remove wire ties from outdoor grill.

2. Remove Wooden Top Crate.

⚠WARNING

Improper Unit Lift!

Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage. Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

3. Rig the unit as shown in the weights section. Attach adequate strength lifting slings to all four lifting brackets in the unit base rail. Do not use cables, chains, or slings except as shown.
4. Install a lifting bar, as shown in the weights section, to protect the unit and to facilitate a uniform lift. The minimum distance between the lifting hook and the top of the unit should be 7 feet.
5. Test-lift the unit to ensure it is properly rigged and balanced, make any necessary rigging adjustments.

Figure 40. Fork pockets (all units except 10 ton high efficiency units)

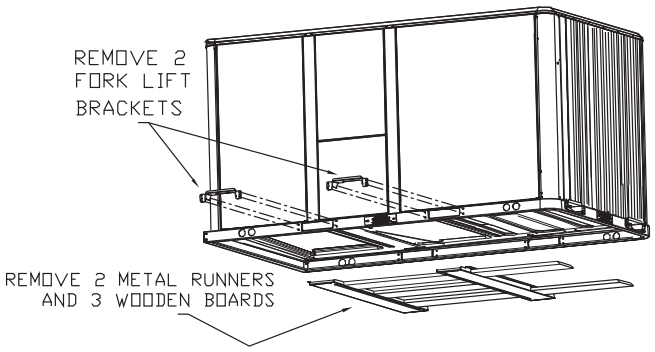
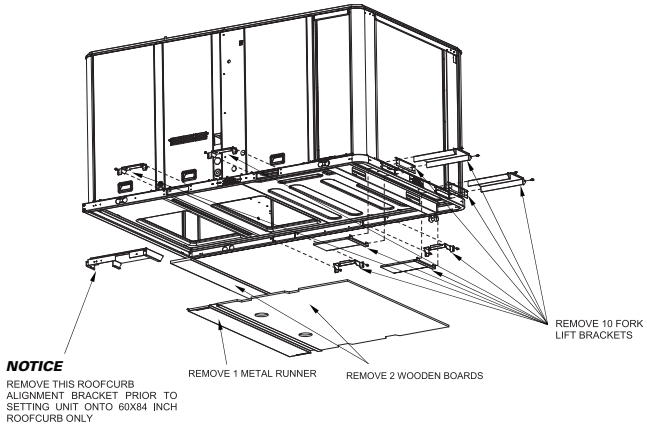


Figure 41. Fork pockets - 10 ton high efficiency units



6. Lift the unit enough to allow the removal of base fork pocket protection components as shown in the following figures.
7. When 10 ton high efficiency units are installed on smaller existing roof curb (50"x 84") for replacement applications, do not remove alignment bracket. This bracket helps assure proper alignment of duct openings.
8. Downflow units; align the base rail of the unit with the curb rail while lowering the unit onto the curb. Make sure that the gasket on the curb is not damaged while positioning the unit.

General Unit Requirements

The checklist listed below is a summary of the steps required to successfully install a commercial unit. This checklist is intended to acquaint the installing personnel with what is required in the installation process. It does not replace the detailed instructions called out in the applicable sections of this manual.

- Check the unit for shipping damage and material shortage; file a freight claim and notify appropriate sales representative.
- Verify correct model, options and voltage from unit nameplate.
- Verify that the installation location of the unit will provide the required clearance for proper operation.
- Assemble and install the roof curb (if applicable). Refer to the latest edition of the curb installers guide that ships with each curb kit.
- Fabricate and install ductwork; secure ductwork to curb.
- Install pitch pocket for power supply through building roof. (If applicable)
- Rigging the unit.
- Set the unit onto the curb; check for levelness.
- Ensure unit-to-curb seal is tight and without buckles or cracks.
- Install and connect a condensate drain line to the evaporator drain connection.

Factory Installed Economizer

- Ensure the economizer has been pulled out into the operating position. Refer to the economizer installers guide for proper position and setup.
- Install all access panels.

Temperature Limit Switch Usage for Electric Heat Units

Units are factory shipped in the downflow discharge configuration but can be field converted to a horizontal discharge configuration. Some, but not all units require a different TCO-A limit switch, which is wire tied near the

terminal block in the heater compartment if horizontal discharge configuration is used.

Horizontal Discharge Conversion (3 to 5 Ton Units)

Note: *3 to 5 ton units supply cover to supply opening and return cover to return opening.*

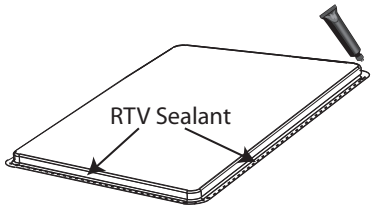
Supplies Needed by Installer for Conversion: 3 oz. tube of High Temperature RTV sealant. (500°F / 260°C: Similar to Dow Corning 736)

Note: *Failure to use recommended sealant could result in unit performance loss.*

If a unit is to be converted to a Horizontal discharge, the following conversion must be performed:

1. Remove RETURN and SUPPLY duct covers.
2. Locate supply cover. Apply ¼ in. (6mm.) continuous bead of 500°F RTV sealant to the flange as shown.

Figure 42. Supply duct cover



3. Position duct cover as shown, rotate 90 degrees to allow entrance into supply opening.
4. Slide duct covers into duct openings until inward edge of duct cover engages with the 2 retaining clips on the duct flanges. Secure the outward edge of each duct cover with 2 screws.
5. Slide RETURN DUCT COVER (insulation side up) into supply opening until inward edge of duct cover engages with the 2 retaining clips on the duct flange. Secure outward edge of the duct cover with two screws.

Note: *Certain unit/electric heater combinations require a limit switch change out for horizontal airflow applications. Refer to the following instructions to determine if this process is required for the unit undergoing installation.*

Horizontal Discharge Conversion (6 to 10 Ton Units)

Note: *6 to 10 ton units the supply cover to return opening & return cover to supply opening.*

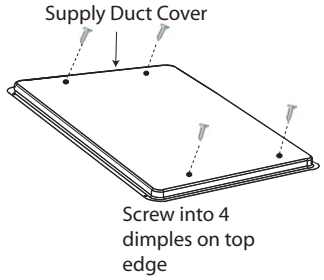
Supplies Needed by Installer for Conversion: 3 oz. tube of high Temperature RTV sealant. (500°F / 260°C: Similar to Dow Corning 736)

Note: *Failure to use recommended sealant could result in unit performance loss.*

If a unit is to be converted to a Horizontal discharge, the following conversion must be performed:

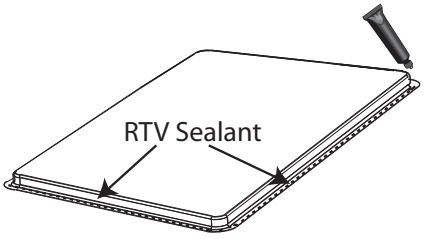
1. Remove RETURN and SUPPLY duct covers.
2. Place SUPPLY DUCT COVER over down-flow return opening. (insulation side down)
3. Using self-drilling screws, (or screws removed from duct cover), screw through dimples to attach DUCT COVER to base.

Figure 43. Supply duct cover



4. On original RETURN DUCT COVER, apply ¼"(6mm.) continuous bead of 500°F RTV sealant around flange (opposite insulation side), as shown.

Figure 44. Return duct cover



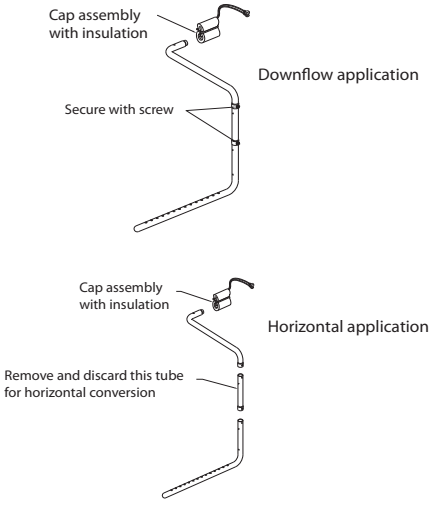
5. Slide RETURN DUCT COVER (insulation side up) into supply opening until inward edge of duct cover engages with the 2 retaining clips on the duct flange. Secure outward edge of the duct cover with two screws.

Note: *If unit is equipped with Return Air Smoke Detector, refer to field conversion instructions for horizontal discharge before installing return air duct.*

Note: *If unit is equipped with Discharge Air Sensing option refer to the following figure for proper tube positioning based on unit tonnage.*

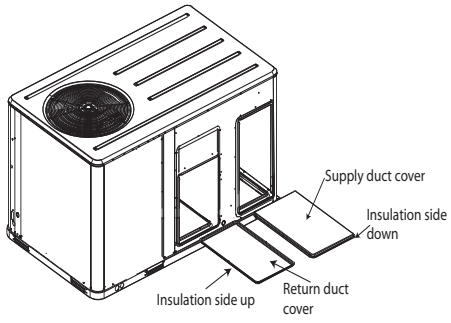
Installation

Figure 45. Discharge air sensor



Note: *Certain unit/electric heater combinations require a limit switch change out for horizontal airflow applications. Refer to the following instructions to determine if this process is required for the unit undergoing installation.*

Figure 46. Supply & return openings



6. After completing installation of the duct covers for horizontal discharge, proceed to TCO-A instructions.

TCO-A Instructions

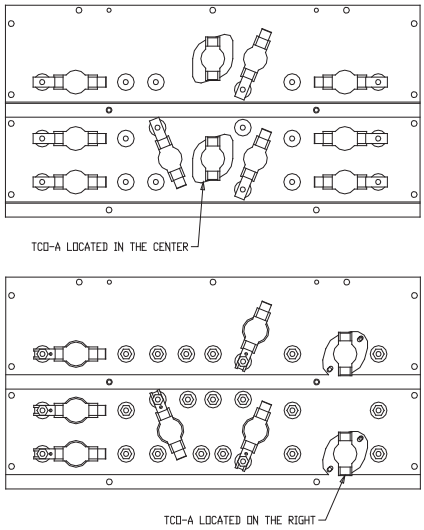
If the unit being installed is listed in the following table and is equipped with the corresponding model number of factory installed electric heater package in the table, the limit control TCO-A must be replaced with the extra limit control shipped in the heater compartment. Replace TCO-A following the instructions in steps 1 through 3 below. If the unit being installed does not have a factory installed electric heater package or is equipped with a factory installed electric heater model that does not correspond to any in this table, skip steps 1 through 3 and go on to next step in the installation process.

Table 6. TCO-A replaced for horizontal duct configuration

Unit Model Number	Electric Heater Model Number	TCO-A location
TSC120H4, THC074	BAYHTRA454	Right
TSC120H4, THC092-102F	BAYHTRA418, 427, 436, 454	Right
TSC120HW	BAYHTRAW18A, 36A, 54A	Right
THC072F4	BAYHTRU427, 436	Center
TSC090H4	BAYHTRW427, 436	Center
TSC090HW	BAYHTRWW27, W36	Center

1. Remove the heater section access panel and open the electric heater dead front panel.
2. TCO-A is the limit control located in the central part of the heater mounting plate and that is located on the bottom of the two heater element assemblies. See Figure 47, p. 32. To replace this device, first remove the two wires connected to the terminals. Next, remove the two screws which secure it to the heater element mounting plate. Once TCO-A has been removed form the heater element mounting plate, discard this device.
3. Obtain the replacement TCO-A which is secured by a wire tie near the electric heater terminal block in the heater compartment. Attach it to the heater element mounting plate with the two screws that were removed in step 2 above. Connect the two wires that were un-hooked in step 2 to the terminals on the new TCO-A. Refer to the heater package wiring diagram to assure that the wiring is connected properly.
4. Close the electric heater dead front panel and replace heat section access panel.

Figure 47. TCO-A location



Return Air Smoke Detector

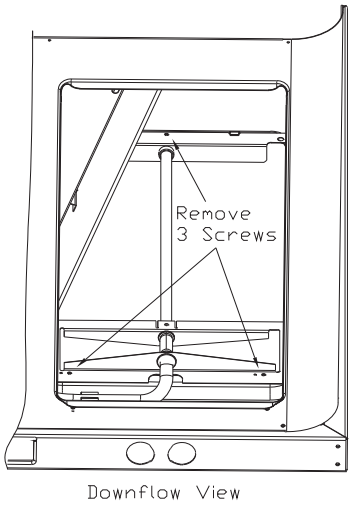
The factory installed Return Air Smoke Detector is installed in the downflow discharge position. No additional field setup is required.

If a unit is to be converted to horizontal discharge, the following conversion must be performed:

1. If the unit has an economizer, it must be pulled out in the operating position.
2. Remove the 3 screws from the mounting brackets.

Note: *Refer to downflow view for screw locations.*

Figure 48. Downflow view



3. Lift the tube and bracket from the downflow duct opening. Rotate the tube and bracket assembly 180 degrees ensuring that the holes on the copper sensing tube face away from the unit and face the return air ductwork.

Note: *Refer to horizontal views below.*

Figure 49. Horizontal view 1

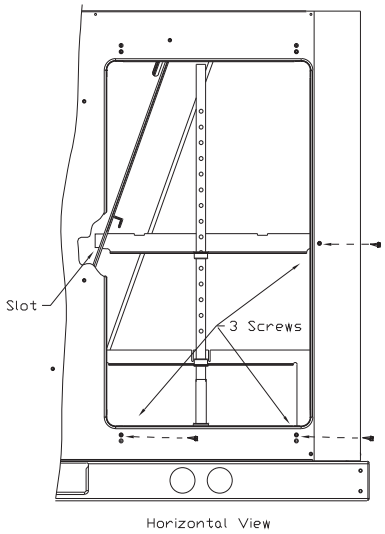
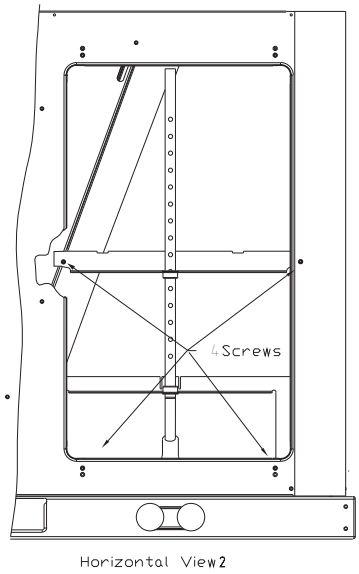


Figure 50. Horizontal view 2



Note: *Check to insure that the flexible tubing lies flat on the base pan surface.*

4. Slide the top bracket down the copper sensing tube. For TSC036G-060G, and THC036-037E units insert the tab on the left side into the slot on the indoor coil block off and secure the right side of the bracket with one of the 3 screws removed in step 2. Refer to Figure 49, p. 33. For THC047E-072E, THC048F-120F, and TSC072H-120H units secure the tab on left side to the indoor coil block off with one of the screws removed in step 2 and secure the right side of the bracket with one of the screws removed from the access panel. Refer to Figure 50, p. 33.
5. Using the remaining 2 screws removed in step 2, secure the bottom bracket. Refer to Figure 49, p. 33.

Note: *Larger diameter holes on bottom bracket line up with the dimples on the rear panel. The smaller diameter holes line up with the screw holes in the rear panel.*

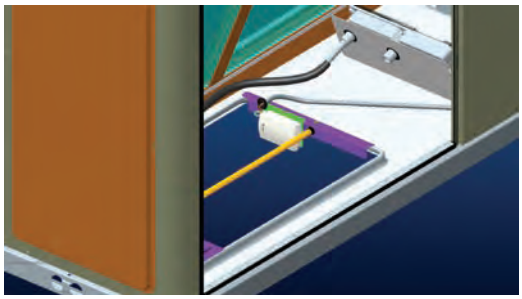
Air-Fi™ Wireless Communication Interface

The factory installed wireless communications interface is installed in the downflow discharge position.

If a unit is to be converted to horizontal discharge, the following conversion must be performed:

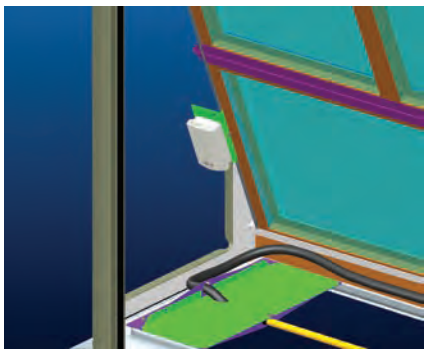
1. If the unit has an economizer, it must be pulled out in the operating position.
2. Remove the screw from the mounting bracket. Refer to downflow view for screw and bracket location.

Figure 51. Wireless communication interface - downflow



3. Mount the bracket in the horizontal discharge location. Refer to horizontal view for screw and bracket location.

Figure 52. Wireless communication interface - horizontal



Note: *Cable ties must be removed to allow the cable to extend to the horizontal mounting location.*

Main Electrical Power Requirements

⚠WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

- Verify that the power supply complies with the unit nameplate specifications.
- Inspect all control panel components; tighten any loose connections.
- Connect properly sized and protected power supply wiring to a field-supplied/installed disconnect switch and to the main power terminal block (HTB1) in the unit control panel.
- Install proper grounding wires to an earth ground.

Electric Heat Requirements

- Verify that the power supply complies with the electric heater specifications on the unit and heater nameplate.
- Inspect the heater junction box and control panel; tighten any loose connections.
- Check electric heat circuits for continuity.

Low Voltage Wiring (AC & DC) Requirements

- Install the zone thermostat, with or without switching subbase.
- Connect properly sized control wiring to the proper termination points between the zone thermostat and the unit control panel.

Condensate Drain Configuration

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

An evaporator condensate drain connection is provided on each unit. Refer to the ductwork section in the Installation chapter for the appropriate drain location.

The condensate drain pan is factory installed to drain condensate to the back side of the unit. Refer to the ductwork section in the Installation chapter for the

drawings. It can be converted to drain condensate out the front side of the unit or through the base.

To convert drain condensate out the front of unit:

1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit and rotate 180°.
4. Slide the condensate drain pan back into the unit, align the drain with the grommeted opening in the rear support panel and push until the coupling is seated in the grommet.
5. Replace the front support panel by aligning the panel with tabs in the raceway. Align the condensate drain pan support in the grommeted hole as the panel is put in place.
6. Replace evaporator access panel and supply air access panels.

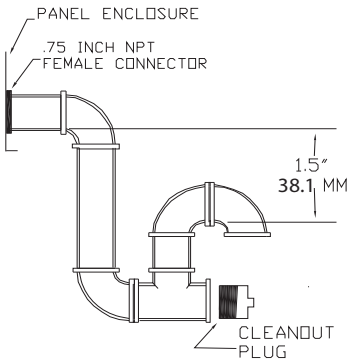
To convert drain condensate through the base of unit:

1. Remove evaporator access panel and supply air access panels.
2. Remove the support panel that the condensate drain pan exits through.
3. Slide the condensate drain pan out of the unit.
4. Place on a level surface in the position it was removed from the unit.
5. Remove the plug knockout in the bottom of the drainpan to convert it to through the base drainage.
6. Plug the original condensate drain opening with a field supplied 3/4" NPT plug.
7. Slide the condensate drain pan back into the unit, align the drain support with the grommeted opening in the rear support panel and push until the support is seated in the grommet.
8. Replace the front support panel by aligning the panel with tabs in the raceway. Align the plugged condensate drain pan coupling in the grommeted hole as the panel is put in place.
9. Replace evaporator access panel and supply air access panels.

A condensate trap must be installed at the unit due to the drain connection being on the "negative pressure" side of the fan. Install the P-Trap using the guidelines in Figure 53, p. 35.

A condensate drain line must be connected to the P-Trap. Pitch the drain lines at least 1/2 inch for every 10 feet of horizontal run to assure proper condensate flow. Do not allow the horizontal run to sag causing a possible double-trap condition which could result in condensate backup due to "air lock".

Figure 53. Condensate trap installation



Filter Installation

The quantity of filters is determined by unit size. Access to the filters is obtained by removing the filter access panel.

Refer to the unit Service Facts (shipped with each unit) for filter requirements.

Note: *Do not operate the unit without filters.*

Field Installed Power Wiring

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

An overall dimensional layout for the field installed wiring entrance into the unit is illustrated in the Dimensions and Weights chapter. To insure that the unit's supply power wiring is properly sized and installed, follow the following guidelines.

Verify that the power supply available is compatible with the unit's nameplate ratings. The available supply power must be within 10% of the rated voltage stamped on the nameplate. Use only copper conductors to connect the power supply to the unit.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as unit terminals are not designed to accept other types of conductors.

Installation

Important: *If the unit is not equipped with an optional factory installed non-fused disconnect switch or circuit breaker, a field supplied disconnect switch must be installed at or near the unit in accordance with the National Electrical Code (NEC latest edition).*

Main Unit Power

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

Standard Wiring

1. Location of the applicable electrical service entrance is illustrated in the Dimensions and Weights chapter. Complete the unit's power wiring connections at Compressor Contactor # 1 (CC1) inside the unit control panel. Refer to the customer connection diagram that is shipped with the unit for specific termination points
2. Provide proper grounding for the unit in accordance with local and national codes.

Optional TBUE Wiring (Through-the-Base Electrical Option)

Location of the applicable electrical service is illustrated below. Refer to the customer connection diagram that is shipped with the unit for specific termination points. The termination points, depending on the customer option selected would be a factory mounted non-fused disconnect switch (UDC) or circuit breaker (UCB). If neither a factory mounted non-fused disconnect switch (UDC) or circuit breaker (UCB) was factory mounted, field wiring connections should be terminated in the control box at Compressor Contactor # 1 (CC1).

Provide proper grounding for the unit in accordance with local and national codes.

Note: *Black Gasket is shipped from the factory and is located in the literature Ship With bag in the control box. Apply Black Gasket around conduit plate on all 4 sides after installation to prevent air leakage from the building entering the electrical enclosures.*

Note: *Seal between wiring and conduit with Black Gasket or weather proof sealer to prevent air leakage from the building entering the electrical enclosures. Also seal around conduit and wiring at all roof and curb penetrations.*

Figure 54. All units except 10 ton high efficiency with hot gas reheat dehumidification.

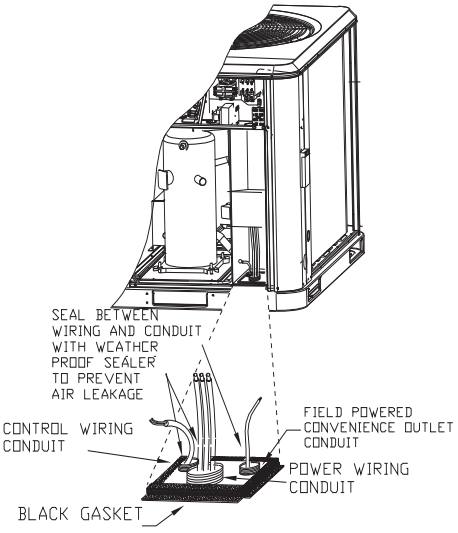
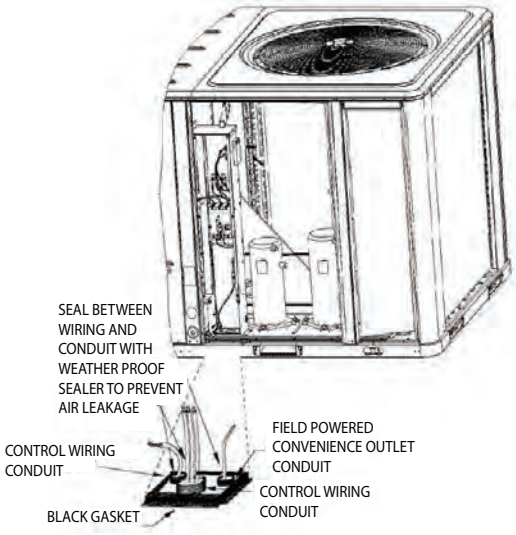


Figure 55. 10 ton high efficiency



Field Installed Control Wiring

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

An overall layout of the various control options available with the required number of conductors for each control device is illustrated in Figure 68, p. 44.

Note: *All field wiring must conform to NEC guidelines as well as state and local codes.*

Control Power Transformer

The 24 volt control power transformers are to be used only with the accessories called out in this manual. Transformers rated greater than 50 VA are equipped with internal circuit breakers. If a circuit breaker trips, turn "Off" all power to the unit before attempting to reset it.

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

The transformer is located in the control panel. The circuit breaker is located on the left side of the transformer and can be reset by pressing in on the black reset button.

Controls using 24 VAC

Before installing any connecting wiring, refer to the Dimensions and Weights chapter for the electrical access locations provided on the unit and Table 7, p. 37 or Table 8, p. 37 for AC conductor sizing guidelines, and;

1. Use copper conductors unless otherwise specified.
2. Ensure that the AC control wiring between the controls and the unit's termination point does not exceed three (3) ohms/conductor for the length of the run.

NOTICE

Controls Using 24 VAC!

Resistance in excess of 3 ohms per conductor could cause component failure due to insufficient AC voltage supply.

Note: *Be sure to check all loads and conductors for grounds, shorts, and mis-wiring.*

3. Do not run the AC low voltage wiring in the same conduit with the high voltage power wiring.
4. Route low voltage wiring per illustrations on page Figure 61, p. 40.

Table 7. Electromechanical thermostat 24V AC conductors with ReliaTel™ units

Distance from Unit to Control	Recommended Wire Size
000 - 460 feet	18 gauge
000 - 140 m	.75 mm2
461 - 732 feet	16 gauge
141 - 223 m	1.3 mm2
733 - 1000 feet	14 gauge
224 - 305 m	2.0 mm2

Table 8. Electromechanical thermostat 24V AC conductors with Electromechanical unit

Distance from Unit to Control	Recommended Wire Size
0 - 30 feet	22 gauge
0 - 9.1 m	.33 m2
31 - 50 feet	20 gauge
9.5 - 15.2 m	.50m2
51 - 75 feet	18 gauge
15.5 - 22.9 m	.75 m2
76 - 125 feet	16 gauge
23.1 - 38.1 m	1.3 m2
126 - 200 feet	14 gauge
38.4 - 60.9 m	2.0 m2

Controls using DC Analog Input/Outputs (Standard Low Voltage Multi conductor Wire)

Before installing any connecting wiring between the unit and components utilizing a DC analog input\output signal, refer to the Dimensions and Weights chapter for the electrical access locations provided on the unit.

- Table 9, p. 38 lists the conductor sizing guidelines that must be followed when interconnecting the DC binary output devices and the system components utilizing a DC analog input/output signal to the unit.

Installation

Note: *Resistance in excess of 2.5 ohms per conductor can cause deviations in the accuracy of the controls.*

Note: *Ensure that the wiring between controls and the unit's termination point does not exceed two and a half (2.5) ohms/conductor for the length of the run.*

- Do not run the electrical wires transporting DC signals in or around conduit housing high voltage wires.
- Route low voltage wiring per illustrations on page 40.

Note: *If digit 9 in the unit model number equals "E" (electromechanical control), accessory relay BAY24X042 is required if the thermostat does not energize the fan circuit in the heating mode.*

DC Conductors

Table 9. Zone sensor module wiring

Distance from Unit to Control	Recommended Wire Size
0 - 150 feet	22 gauge
0 - 45.7 m	.33 mm2
151 - 240 feet	20 gauge
46 - 73.1 m	.50 mm2
241 -385 feet	18 gauge
73.5 - 117.3 m	.75 mm2
386 - 610 feet	16 gauge
117.7 - 185.9 m	1.3 mm2
611 - 970 feet	14 gauge
186.2 - 295.7 m	2.0 mm2

Figure 56. ReliaTel™ conventional thermostat field wiring diagrams

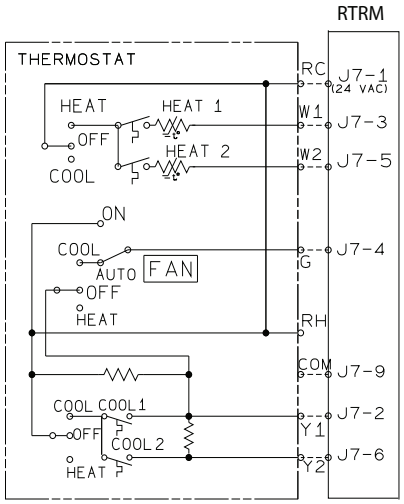


Figure 57. Typical field wiring diagrams for electromechanical thermostat

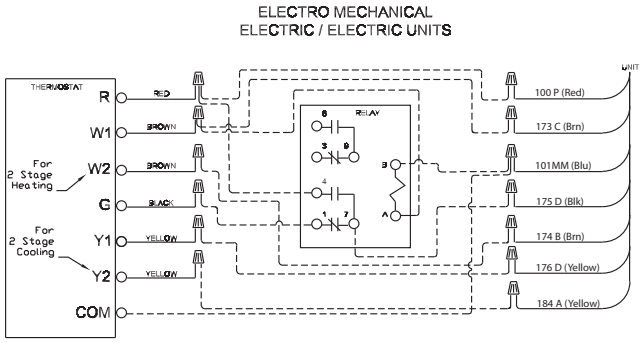


Figure 58. ReliaTel options module

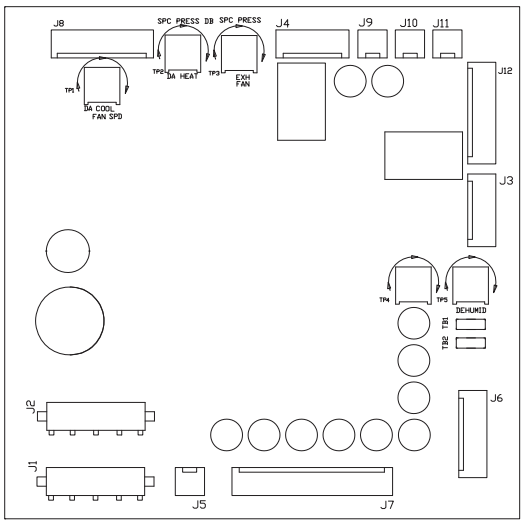


Figure 59. ReliaTel™ relative humidity sensor (dehumidification option)

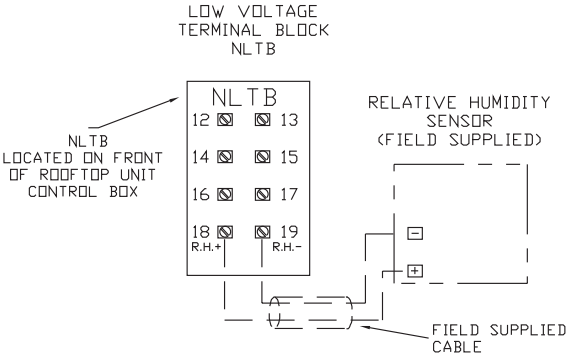
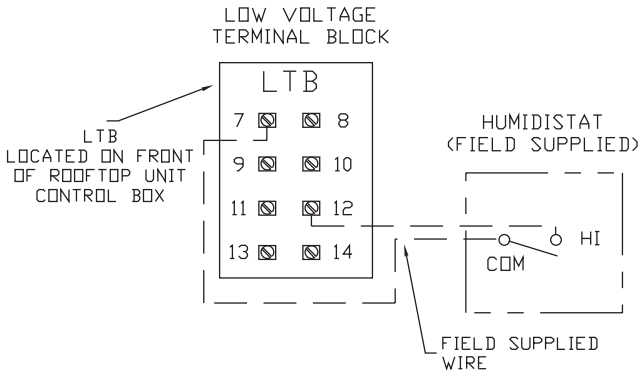


Figure 60. ReliaTel humidistat (dehumidification option)



Installation

Figure 61. Electromechanical control customer low voltage routing (all units except 10 ton high efficiency)

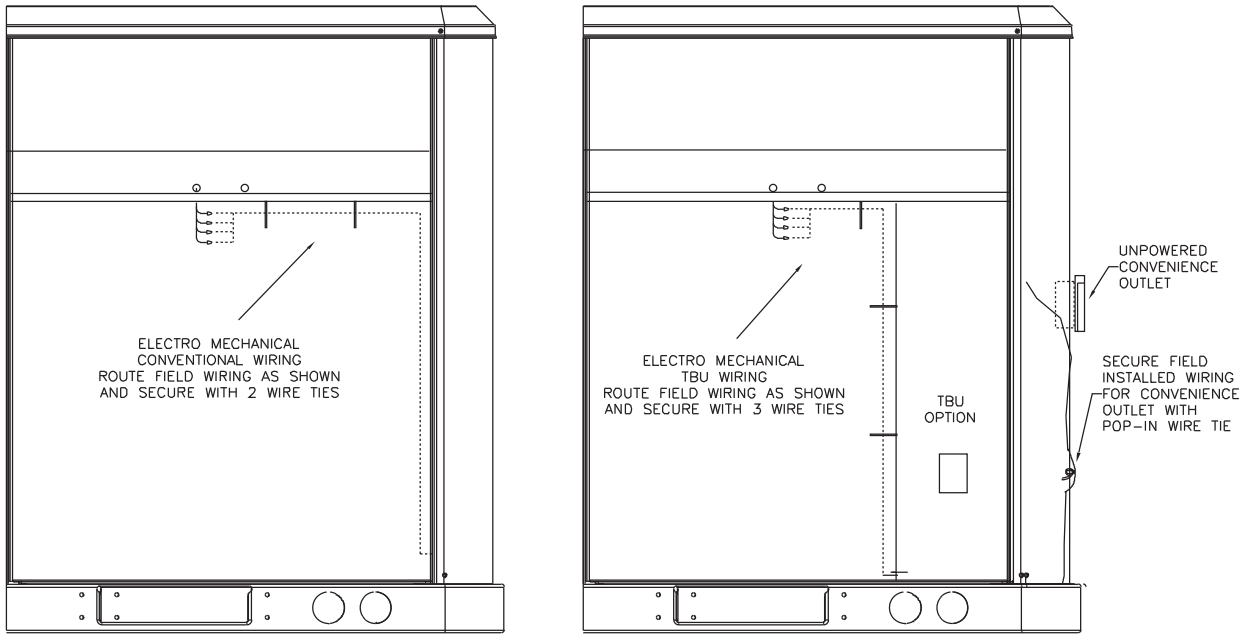


Figure 62. ReliaTel control customer low voltage routing (all units except 10 ton high efficiency)

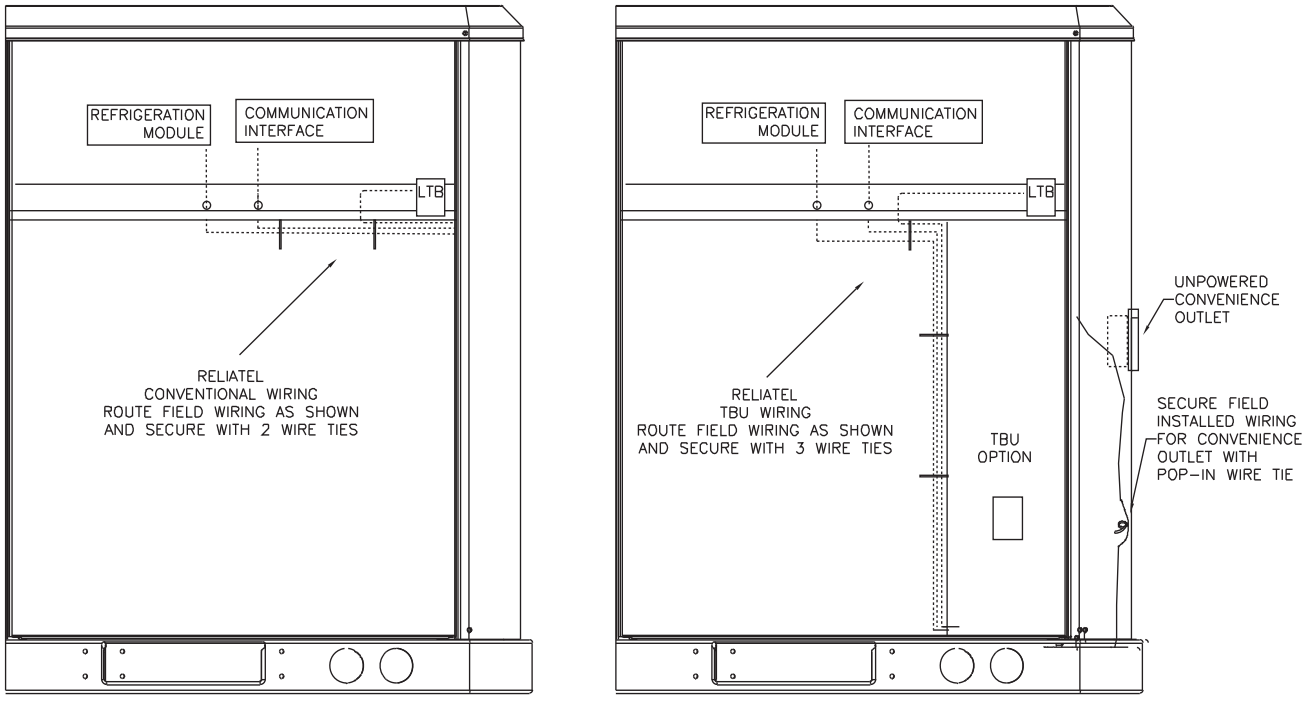


Figure 63. ReliaTel™ (without TBUE) control customer wire routing (10 ton high efficiency)

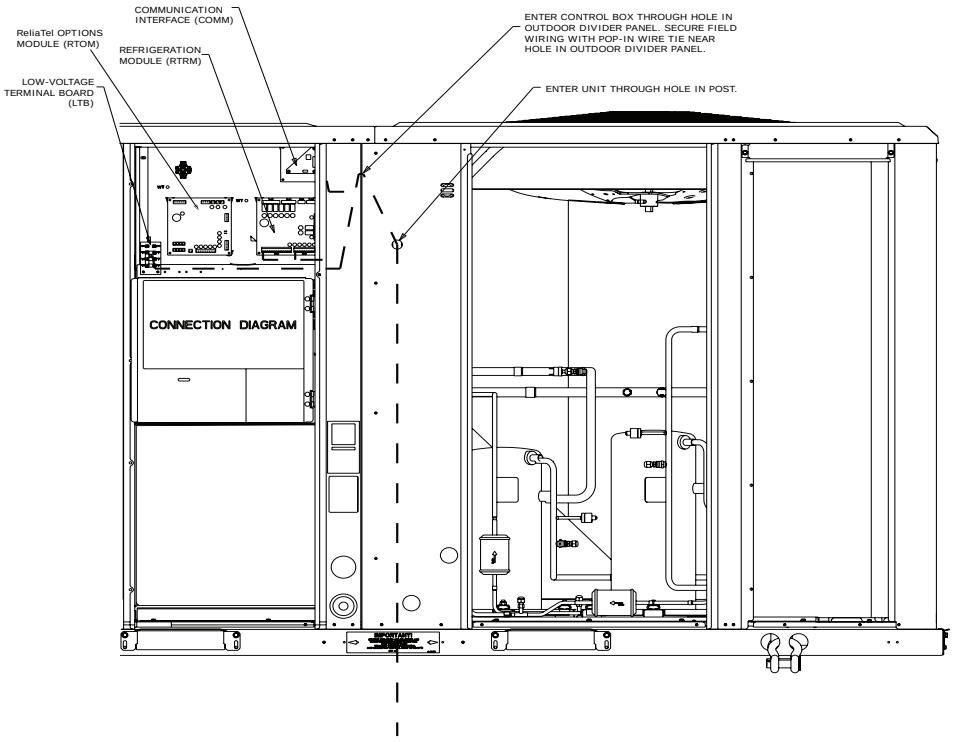


Figure 64. ReliaTel (with TBUE) control customer wire routing (10 ton high efficiency)

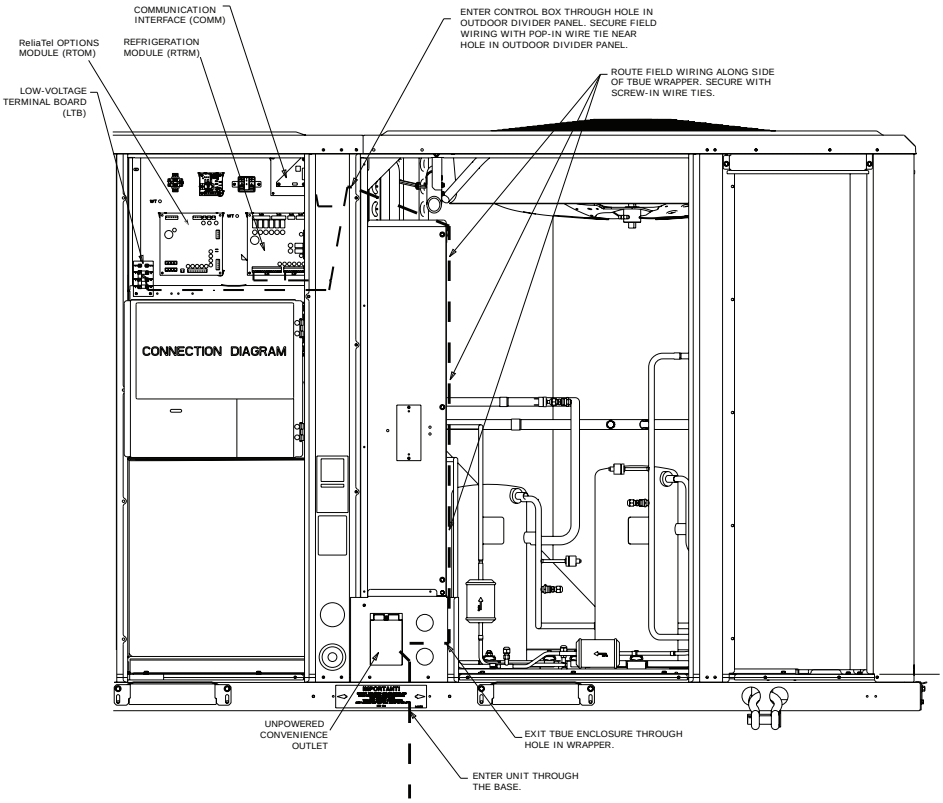


Figure 65. Electromechanical (without TBUE) control customer wire routing (10 ton high efficiency)

Installation

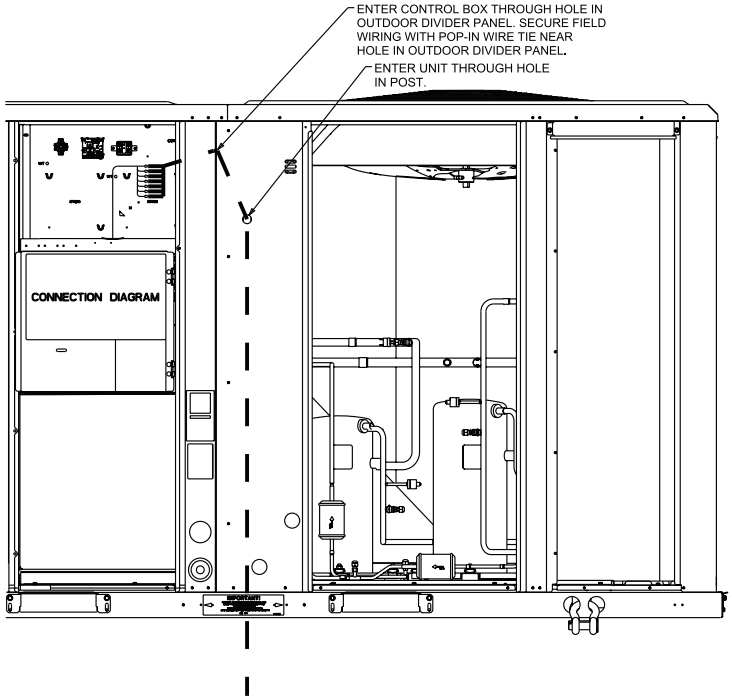
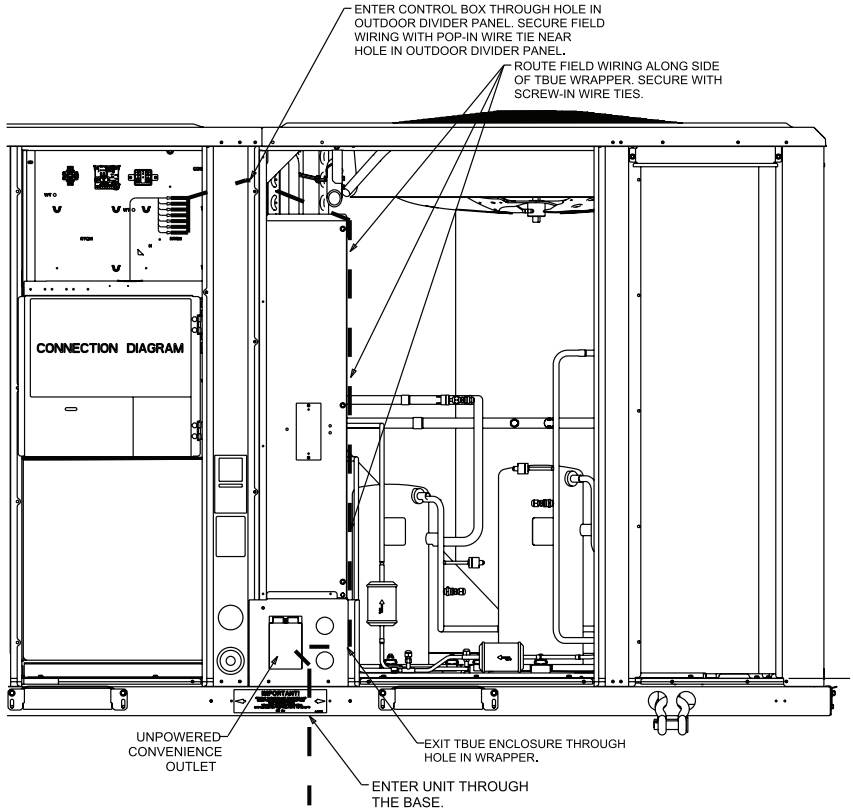


Figure 66. Electromechanical (with TBUE) control customer wire routing (10 ton high efficiency)



Space Temperature Averaging (ReliaTel™ only)

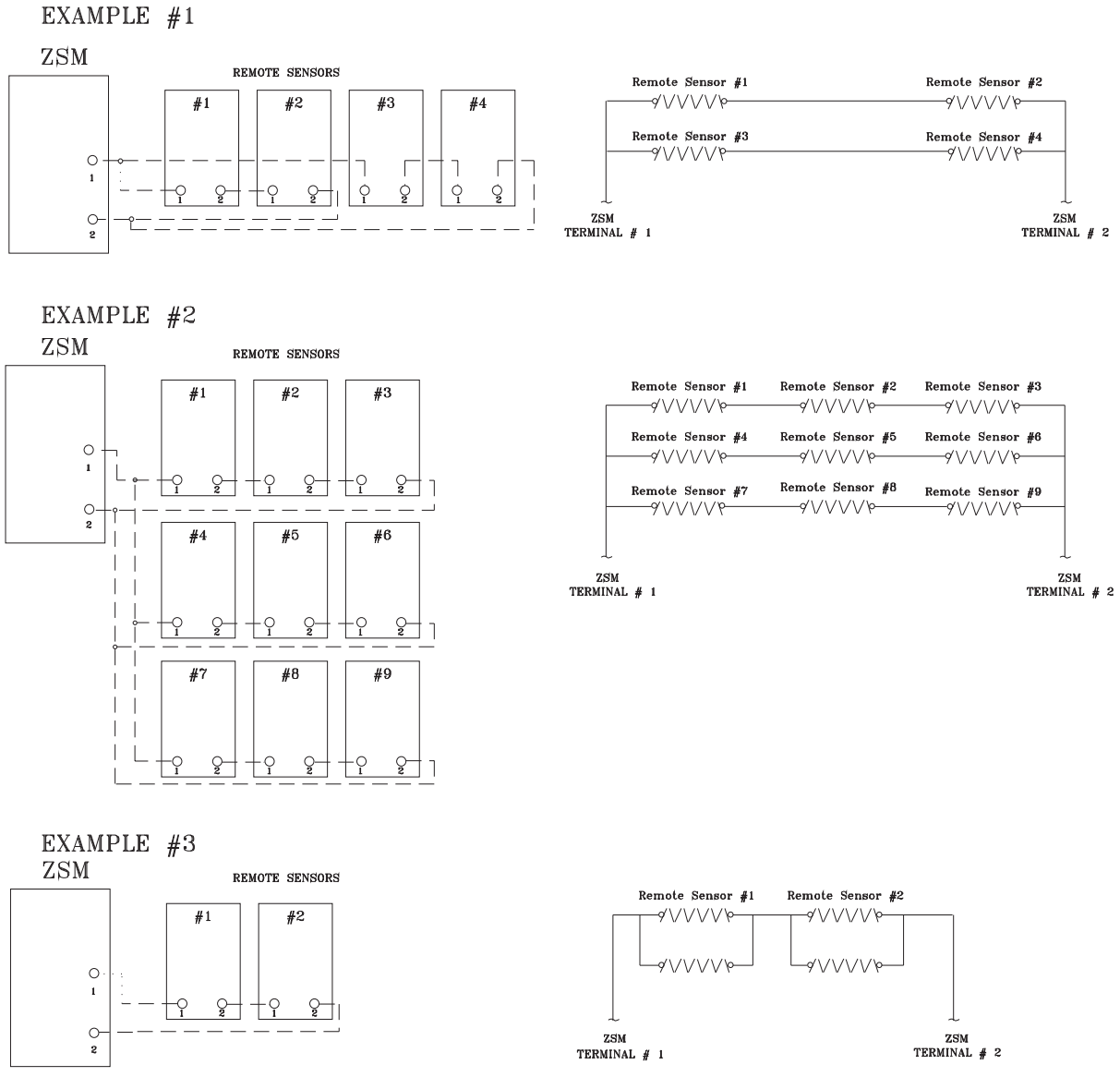
Space temperature averaging is accomplished by wiring a number of remote sensors in a series/parallel circuit.

Using the BAYSENS016* or BAYSENS077*, at least four sensors are required to accomplish space temperature averaging.

- Example #1 illustrates two series circuits with two sensors in each circuit wired in parallel. The square of any number of remote sensors is required.
- Example #2 illustrates three sensors squared in a series/parallel circuit. Using BAYSENS077*, two sensors are required to accomplish space temperature averaging.

Example #3 illustrates the circuit required for this sensor. Table 10, p. 45 lists the temperature versus resistance coefficient for all sensors.

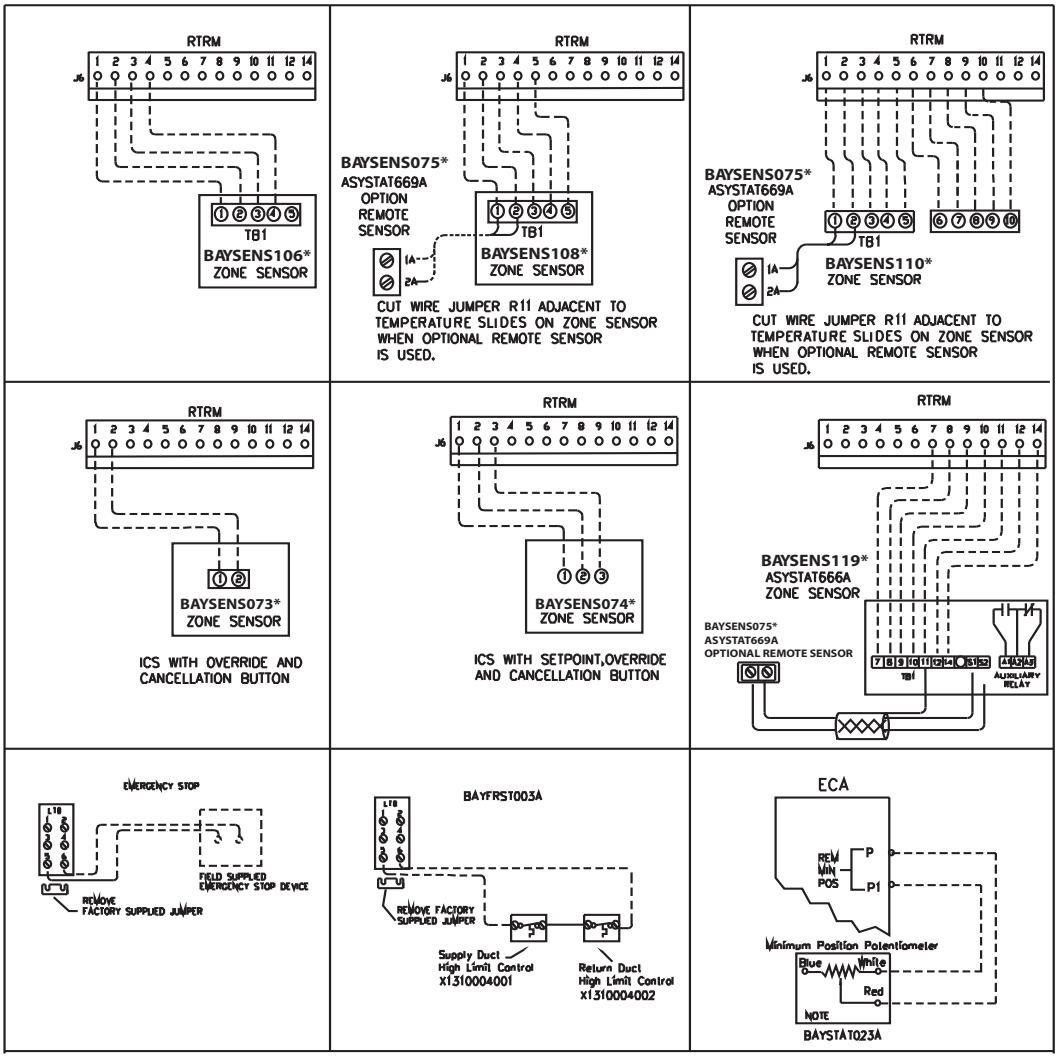
Figure 67. Examples



Note: *Wiring pin numbers are for reference only. There are multiple smoke detector systems that could have differently numbered pins. For correct wiring details, please refer to the specific smoke detector literature that accompanied this unit.*

Installation

Figure 68. Typical field wiring diagrams for optional controls (ReliaTel™ only)



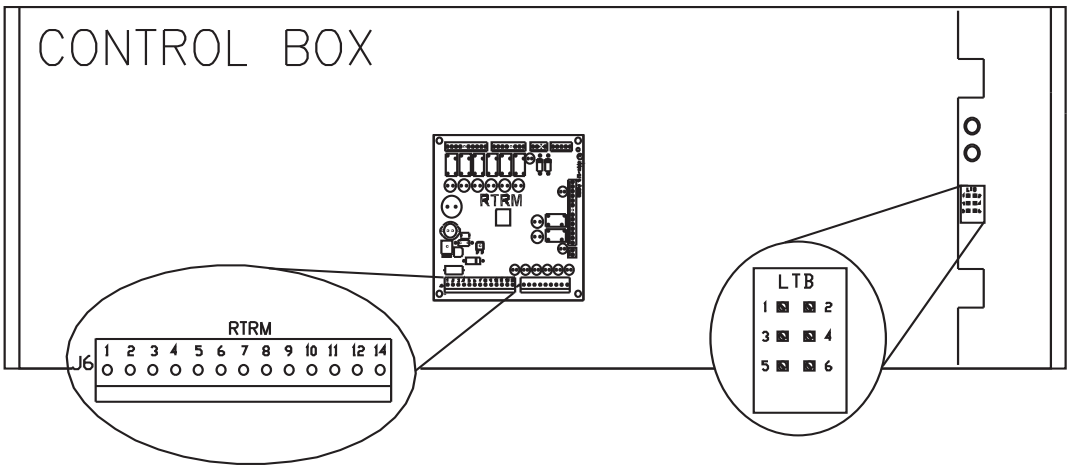


Table 10. Temperature vs. resistance

Temperature		
Degrees F°	**Degrees C°**	**Nominal Resistance**
-20°	-28.9°	170.1 K - Ohms
-15°	-26.1°	143.5 K - Ohms
-10°	-23.3°	121.4 K - Ohms
-5°	-20.6°	103.0 K - Ohms
0°	-17.8°	87.56 K - Ohms
5°	-15.0°	74.65 K - Ohms
10°	-12.2°	63.80 K - Ohms
15°	-9.4°	54.66 K - Ohms
20°	-6.7°	46.94 K - Ohms
25°	-3.8°	40.40 K - Ohms
30°	-1.1°	34.85 K - Ohms
35°	1.7°	30.18 K - Ohms
40°	4.4°	26.22 K - Ohms
45°	7.2°	22.85 K - Ohms
50°	10.0°	19.96 K - Ohms
55°	12.8°	17.47 K - Ohms
60°	15.6°	15.33 K - Ohms
65°	18.3°	13.49 K - Ohms
70°	21.1°	11.89 K - Ohms
75°	23.9°	10.50 K - Ohms
80°	26.7°	9.297 K - Ohms
85°	29.4°	8.247 K - Ohms
90°	32.2°	7.330 K - Ohms
95°	35.0°	6.528 K - Ohms

Pre-Start

Use the checklist provided below in conjunction with the "General Unit Requirements" checklist to ensure that the unit is properly installed and ready for operation.

⚠WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

- Check all electrical connections for tightness and "point of termination" accuracy.
- Verify that the condenser airflow will be unobstructed.

⚠WARNING

Rotating Components!

Failure to follow all safety precautions below could result in rotating components cutting and slashing technician which could result in death or serious injury. During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks.

- Verify that the condenser fan and indoor blower turn freely without rubbing and are properly tightened on the shafts.
- Check the supply fan belts for proper tension and the fan bearings for sufficient lubrication. If the belts require adjustment, or if the bearings need lubricating, refer to the maintenance section of this manual for instructions.
- Verify that a condensate trap is installed and the piping is properly sized and pitched.
- Verify that the correct size and number of filters are in place.
- Inspect the interior of the unit for tools and debris and install all panels in preparation for starting the unit.

Voltage Imbalance

Three phase electrical power to the unit must meet stringent requirements for the unit to operate properly.

Measure each leg (phase-to-phase) of the power supply. Each reading must fall within the utilization range stamped on the unit nameplate. If any of the readings do not fall within the proper tolerances, notify the power company to correct this situation before operating the unit.

Excessive three phase voltage imbalance between phases will cause motors to overheat and eventually fail. The maximum allowable voltage imbalance is 2%. Measure and record the voltage between phases 1, 2, and 3 and calculate the amount of imbalance as follows:

$$\%\ \text{Voltage Imbalance} = \frac{100 \times AV - VD}{AV} \quad \text{where;}$$

$$AV\ (\text{Average Voltage}) = \frac{\text{Volt 1} + \text{Volt 2} + \text{Volt 3}}{3}$$

V1, V2, V3 = Line Voltage Readings

VD = Line Voltage reading that deviates the farthest from the average voltage.

Example: If the voltage readings of the supply power measured 221, 230, and 227, the average volts would be:

$$\frac{221 + 230 + 227}{3} = 226\ \text{Avg.}$$

VD (reading farthest from average) = 221

The percentage of Imbalance equals:

$$\frac{100 \times 226 - 221}{226} = 2.2\%$$

The 2.2% imbalance in this example exceeds the maximum allowable imbalance of 2.0%. This much imbalance between phases can equal as much as a 20% current imbalance with a resulting increase in motor winding temperatures that will decrease motor life. If the voltage imbalance is over 2%, notify the proper agencies to correct the voltage problem before operating this equipment.

Electrical Phasing (Three Phase Motors)

The compressor motor(s) and the supply fan motor are internally connected for the proper rotation when the incoming power supply is phased as A, B, C.

Proper electrical supply phasing can be quickly determined and corrected before starting the unit by using an instrument such as an Associated Research Model 45 Phase Sequence Indicator and following the steps below:

⚠WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

- Turn the field supplied disconnect switch that provides power to the main power terminal block or to the "Line" side of the optional factory mounted disconnect switch to the "Off" position.
- Connect the phase sequence indicator leads to the terminal block or to the "Line" side of the optional factory mounted disconnect switch as follows;
  - Black (phase A) to L1
  - Red (phase B) to L2
  - Yellow (phase C) to L3
- Close the field supplied main power disconnect switch or circuit protector switch that provides the supply power to the unit.

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

- Observe the ABC and CBA phase indicator lights on the face of the sequencer. The ABC indicator light will glow if the phase is ABC. If the CBA indicator light glows, open the disconnect switch or circuit protection switch and reverse any two power wires.
- Restore the main electrical power and recheck the phasing. If the phasing is correct, open the disconnect switch or circuit protection switch and remove the phase sequence indicator.

Compressor Crankcase Heaters (Optional)

Each compressor can be equipped with a crankcase heater (On some units the crankcase heater comes standard). The proper operation of the crankcase heater is important to maintain an elevated compressor oil temperature during the "Off" cycle to reduce oil foaming during compressor starts.

Oil foaming occurs when refrigerant condenses in the compressor and mixes with the oil. In lower ambient conditions, refrigerant migration to the compressor could increase.

When the compressor starts, the sudden reduction in crankcase pressure causes the liquid refrigerant to boil rapidly causing the oil to foam. This condition could damage compressor bearings due to reduced lubrication and could cause compressor mechanical failures.

Before starting the unit in the "Cooling" mode, set the system switch to the "Off" position and turn the main power disconnect to the "On" position and allow the crankcase heater to operate a minimum of 8 hours.

Before closing the main power disconnect switch, insure that the "System" selection switch is in the "Off" position and the "Fan" selection switch is in the "Auto" position.

Close the main power disconnect switch and the unit mounted disconnect switch, if applicable.

Note: *Upon closing main power disconnect and the unit mounted disconnect switch or circuit breaker, the phase monitor will verify proper phasing. If LED on face of the monitor is red, correct supply power fault.*

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

ReliaTel™ Controls

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functional. It also checks the configuration parameters against the components connected to the system. The Liteport LED located on the RTRM module is turned "On" within one second of power-up if internal operation is okay.

Use one of the following "Test" procedure to bypass some time delays and to start the unit at the control panel. Each step of unit operation can be activated individually by temporarily shorting across the "Test" terminals for two to three seconds. The Liteport LED located on the RTRM

Pre-Start

module will blink when the test mode has been initiated. The unit can be left in any "Test" step for up to one hour before it will automatically terminate, or it can be terminated by opening the main power disconnect switch.

Once the test mode has been terminated, the Liteport LED will glow continuously and the unit will revert to the "System" control.

Table 11. Service test guide for component operation

Test Step	Mode	Fan	Econ [a]	Comp 1	Comp 2	Heat 1	Heat 2	Resistance	PWM Output[b]	Multi-Speed Fan Output
1	Fan	On	Minimum Position Setpoint 0%	Off	Off	Off	Off	2.2KΩ	50%	low
	Minimum Ventilation	On	Selectable	Off	Off	Off	Off			
2	Economizer Test Open	On	Open	Off	Off	Off	Off	3.3KΩ	50%[c]	low
3	Cool Stage 1	On	Minimum Position	On [d]	Off	Off	Off	4.7KΩ	82%	low
4 [e]	Cool Stage 2	On	Minimum Position	On (d)	On (d)	Off	Off	6.8KΩ	100%	High (2-step cooling) Low (3-step cooling)
5 (e)	Cool Stage 3	On	Minimum Position	On (d)	On (d)	Off	Off	8.2KΩ	100%	High
6 (e)	Reheat	On	Minimum	On	On	Off	Off	33KΩ	100%[f]	High
7 (e)	Heat Stage 1	On	Minimum	Off	Off	On	Off	10KΩ	100%	High
8 (e)	Heat Stage 2	On	Minimum	Off	Off	On	On	15KΩ	100%	High

(a) The exhaust fan will turn on anytime the economizer damper position is equal to or greater than the exhaust fan setpoint.
(b) The PWM Output is in reference to the user selected maximum unit fan speed.
(c) Regardless of the Economizer Mode configuration, the unit will run the Supply Fan at the minimum speed during the Economizer step of the Service Test.
(d) The condenser fans will operate any time a compressor is 'On' providing the outdoor air temperatures are within the operating values.
(e) Steps for optional accessories and non-applicable modes in unit will be skipped.
(f) Units with Enhanced Dehumidification only will not perform this step during Service Test.

Test Modes

There are three methods in which the "Test" mode can be cycled at LTB-Test 1 and LTB-Test 2.

- Step Test Mode - This method initiates the different components of the unit, one at a time, by temporarily shorting across the two test terminals for two to three seconds.

  For the initial start-up of the unit, this method allows the technician to cycle a component "On" and have up to one hour to complete the check.
- Resistance Test Mode - This method can be used for start-up providing a decade box for variable resistance outputs is available. This method initiates the different components of the unit, one at a time, when a specific resistance value is placed across the two test terminals. The unit will remain in the specific test mode for approximately one hour even though the resistance is left on the test terminals.
- Auto Test Mode - This method is not recommended for start-up due to the short timing between individual component steps. This method initiates the different components of the unit, one at a time, when a jumper is installed across the test terminals. The unit will start the first test step and change to the next step every 30 seconds.

  At the end of the test mode, control of the unit will automatically revert to the applied "System" control method.

For unit test steps, test modes, and step resistance values to cycle the various components, refer to Table 11, p. 48.

Electromechanical Controls Test Procedure

See unit schematic for correct wire numbers.

Fan Test and Minimum Ventilation

Connect red thermostat wire (R) to black thermostat wire (G).

Economizer Cooling

Connect a jumper wire across OTS on Economizer Control (ECA).

Connect red thermostat (R) wire to yellow thermostat wire (Y1).

Cool 1

Connect red thermostat wire (R) to yellow thermostat wire (Y1).

Cool 2

Connect red thermostat wire (R) to yellow thermostat wire (Y2).

Heat 1

Connect red thermostat wire (R) to brown thermostat wire (W1).

Heat 2

Connect red thermostat wire (R) to brown thermostat wire (W2).

Unit Start-Up

Sequence of Operation

Units are offered with two control options, electromechanical or ReliaTel™.

Note: *Refer to the unit nameplate: If the 9th digit of the model number = R, proceed with the ReliaTel™ Controls section within this chapter. If the 9th digit of the model number = E, proceed with the Electromechanical Controls section within this chapter.*

Note: *The optional condensate overflow switch (COF) will shut the unit down if the float is raised and the switch is closed.*

ReliaTel™ Controls

ReliaTel™ Controls - Constant Volume (CV)

ReliaTel™ control is a microelectronic control feature, which provides operating functions that are significantly different than conventional electromechanical units. The master module is the ReliaTel™ refrigeration module (RTRM).

The RTRM provides compressor anti-short cycle timing functions through minimum "Off" and "On" timing to increase reliability, performance and to maximize unit efficiency.

Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functioning. It checks the configuration parameters against the components connected to the system.

The LED located on the RTRM module is turned "On" within one second after power-up if all internal operations are okay.

ReliaTel™ Control Cooling without an Economizer

When the system switch is set to the "Cool" position and the zone temperature rises above the cooling setpoint control band, the RTRM energizes the (K9) relay coil located on the RTRM. When the K9 relay contacts close, the compressor contactor (CC1) coil is energized provided the low pressure control (LPC1), high pressure control (HPC1) and discharge line thermostat (TDL 1) are closed. When the CC1 contacts close, compressor (CPR1) and the outdoor fan motor (ODM) start to maintain the zone temperature to within ± 2°F of the sensor setpoint at the sensed location.

If the first stage of cooling can not satisfy the cooling requirement, the RTRM energizes the (K10) relay coil located on the RTRM. When the (K10) relay contacts close, the compressor contactor (CC2) coil is energized provided the low pressure control (LPC2), high pressure control (HPC2) and discharge line thermostat (TDL 2) are closed. When the CC2 contacts close, compressor (CPR2) starts to maintain the zone temperature to within ± 2°F of the sensor setpoint at the sensed location.

Three-Stages of Cooling

Note: *High efficiency units only.*

When the unit is configured for three-stage cooling, and the system switch is set to the cool position and the zone temperature rises above the cooling setpoint control band, the RTRM energizes the (K10) relay coil located on the RTRM. When the (K10) relay contacts close, compressor contactor (CC2) is energized. This is the smaller of the two compressors (CPR2). This staging order is opposite standard staging order.

If the first stage of cooling can not satisfy the cooling requirement, the RTRM energizes the (K9) relay coil and de-energizes the (K10) relay coil on the RTRM. Compressor contactor (CC1) is energized, bringing on the larger of the two compressors (CPR1). Compressor contactor (CC2) is de-energized, turning off the smaller compressor.

If the second stage of cooling can not satisfy the cooling requirement, the RTRM keeps the (K9) relay coil energized and energizes the (K10) relay coil. Compressor contactors (CC1) and (CC2) are energized, and both compressors (CPR1 and CPR2).

Lead/Lag is disabled with three-stage cooling. A unit configured for three-stage cooling and controlled with a thermostat will operate as a two-stage unit.

ReliaTel™ Control Evaporator Fan Operation (for Gas Units)

When the fan selection switch is set to the "Auto" position, the RTRM energizes the (K6) relay coil approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the RTRM energizes the (K6) relay coil approximately 45 second after gas ignition. Closing the (K6) contacts on the RTRM energizes the indoor fan relay (F) coil to start the indoor fan motor (IDM).

The RTRM de-energizes the fan relay (F) approximately 60 seconds after the cooling requirement has be satisfied to enhance unit efficiency. When the heating cycle is terminated, the indoor fan relay (F) coil is de-energized approximately 90 seconds after the heating requirement.

When the fan selection switch is set to the "On" position, the RTRM keeps the indoor fan relay coil (F) energized for continuous fan motor operation.

When the unit is equipped with the optional clogged filter switch, wired between terminals J7-3 and J7-4 on the ReliaTel™ options module (RTOM), the RTRM produces an analog output if the clogged filter switch (CFS) closes for two minutes after a request for fan operation. When the system is connected to a remote panel, the "SERVICE" LED will be turned on when this failure occurs.

ReliaTel™ Control Evaporator Fan Operation (for Cooling Only Units)

When the fan selection switch is set to the "Auto" position, the RTRM energizes the (K6) relay coil approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the RTRM energizes the (K6) relay coil approximately 1 second before energizing the electric heat contactors. Closing the (K6) contacts on the RTRM energizes the indoor fan relay (F) coil to start the indoor fan motor (IDM). The RTRM de-energizes the fan relay (F) approximately 60 seconds after the cooling requirement has be satisfied to enhance unit efficiency.

When the heating cycle is terminated, the indoor fan relay (F) coil is de-energized at the same time as the heater contactors.

When the fan selection switch is set to the "On" position, the RTRM keeps the indoor fan relay coil (F) energized for continuous fan motor operation.

When the unit is equipped with the optional clogged filter switch, wired between terminals J7-3and J7-4 on the ReliaTel™ options module (RTOM), the RTRM produces an analog output if the clogged filter switch (CFS) closes for two minutes after a request for fan operation.

When the system is connected to a remote panel, the "SERVICE" LED will be turned on when this failure occurs.

Low Ambient Operation

Note: *For ReliaTel™ units only*

During low ambient operation, outside air temperature below 55°F, the RTRM will cycle the compressor and outdoor fan motor "Off" for approximately 3 minutes after every 10 minutes of accumulated compressor run time. The indoor fan motor (IDM) will continue to operate during this evaporator defrost cycle (EDC) and the compressor and outdoor fan will return to normal operation once the defrost cycle has terminated and the compressor "Off" time delay has been satisfied.

Note: *Units with the dehumidification option - When in dehumidification mode, the unit will not cycle as described above. The unit will run continuously in dehumidification mode at all ambient conditions above 40°F. Dehumidification is disabled at ambient conditions below 40°F.*

Multi-Speed Indoor Motor

Note: *Multi-speed indoor fan available only on 6, 7.5 (dual compressor) & 8.5 tons high efficiency, and 10 ton products with ReliaTel™ controls.*

Note: *Multi-speed indoor fan standard for 17 Plus.*

Models configured for the multi-speed indoor motor will be controlled via the 0-10 Vdc or PWC indoor fan speed output located on the RTOM. R136 (DA COOL_FAN SPD) potentiometer on the RTOM sets the maximum motor speed. Note that the potentiometer voltage readings can be verified via 2-position harness connector located adjacent to the RTOM. The unit schematic will illustrate the exact location. Use a DC voltmeter to read the voltage between the two terminals. Provisions have been made in Service TEST Mode to allow for maximum motor speed adjustment. Motor may be adjusted using modes listed below. Reference the RPM table in the Performance Data section for fan speed.

1. TEST Mode Cool 2; 2-Step Cool applications only
2. TEST Mode Cool 3; 3-Step Cool applications only

Adjust R136 potentiometer clockwise to increase or counterclockwise to decrease motor speed.

Refer to the Fan Output% list below for supply fan output associated with each unit function:

Fan Output%

- Ventilation Only 50%
- Economizer Cooling 65%
- Cool 1 (C1 Energized) 65%
- Cool 2 (C1 + C2) 100% (2-Steps of Cooling)
- Cool 2 (C1 or C2) 65% (3-Steps of Cooling)
- Cool 3 (C1 + C2 Energized) 100%
- Dehumidification Fan Speeds and Enhanced 53%
- Heat 100%

Multi-Zone VAV Sequence of Operation

Supply Air Pressure Control

ReliaTel™ Option Module Control (RTOM)

Supply fan is driven by a pulse-width modulation (PWM) signal from the RTOM.

Note: *PWM = 3 to 5 tons*

A pressure transducer measures duct static pressure, and the supply fan is modulated to maintain the supply air static pressure within an adjustable user-defined range. The range is determined by the supply air pressure setpoint and supply air pressure deadband, which are set through a unit mounted potentiometer or remote panel. The RTOM provides supply fan motor speed modulation.

The supply fan will accelerate or decelerate as required to maintain the supply static pressure setpoint.

Supply Air Static Pressure Limit

The control of the supply fan and VAV boxes are coordinated, with respect to time, during unit start up and transition to/from Occupied/Unoccupied modes to prevent overpressurization of the supply air ductwork. However, if for any reason the supply air pressure exceeds the fixed supply air static pressure limit of 3.5" W.C., the supply fan is shut down and the VAV boxes are closed. The unit is then allowed to restart three times. If the overpressurization condition occurs on the fourth time, the unit is shut down and a manual reset diagnostic is set and displayed at any of the remote panels with LED status lights or communicated to the Integrated Comfort system.

Supply Air Temperature Controls

Cooling/Economizer

During occupied cooling mode of operation, the economizer (if available) and primary cooling are used to control the supply air temperature. The supply air temperature setpoint is user-defined at the unit mounted VAV Setpoint Potentiometer or at the remote panel. If the enthalpy of the outside air is appropriate to use “free cooling”, the economizer will be used first to attempt to satisfy the supply setpoint. On units with economizer, a call for cooling will modulate the fresh air dampers open. The rate of economizer modulation is based on deviation of the discharge temperature from setpoint, i.e., the further away from setpoint, the faster the fresh air damper will open. Note that the economizer is only allowed to function freely if ambient conditions are below the enthalpy control setting or below the return air enthalpy if unit has comparative enthalpy installed. If outside air is not suitable for “economizing”, the fresh air dampers drive to the minimum open position. A field adjustable potentiometer on the Economizer Actuator, or a remote potentiometer can provide the input to establish the minimum damper position. At outdoor air conditions above the enthalpy control setting, primary cooling only is used and the fresh air dampers remain at minimum position. If the unit does not include an economizer, primary cooling only is used to satisfy cooling requirements.

Supply Air Setpoint Reset

Supply air reset can be used to adjust the supply air temperature setpoint on the basis of a zone temperature, return air temperature, or on outdoor air temperature. Supply air reset adjustment is available on the unit mounted VAV setpoint potentiometer for supply air cooling control.

Reset Based on Outdoor Air Temperature

Outdoor air cooling reset is sometimes used in applications where the outdoor temperature has a large effect on building load. When the outside air temperature is low and the building cooling load is low, the supply air setpoint can be raised, thereby preventing subcooling of critical zones. This reset can lower usage of primary cooling and result in a reduction in primary cooling energy usage There are two user-defined parameters that are adjustable through the VAV Setpoint Potentiometer: reset temperature setpoint and reset amount. The amount of reset applied is dependent upon how far the outdoor air temperature is below the supply air reset setpoint. The amount is zero where they are equal and increases linearly toward the value set at the reset amount input. The maximum value is 20°F. If the outdoor air temperature is more than 20°F below the reset temperature setpoint the amount of reset is equal to the reset amount setpoint.

Reset Based on Zone or Return Temperature

Zone or return reset is applied to the zone(s) in a building that tends to overcool or overheat. The supply air temperature setpoint is adjusted based on the temperature of the critical zone(s) or the return air temperature. This can have the effect of improving comfort and/or lowering energy usage. The user-defined parameters are the same as for outdoor air reset. Logic for zone or return reset control is the same except that the origins of the temperature inputs are the zone sensor or return sensor respectively. The amount of reset applied is dependent upon how far the zone or return air temperature is below the supply air reset setpoint. The amount is zero where they are equal and increases linearly toward the value set at the reset amount potentiometer on the VAV setpoint potentiometer. The maximum value is 3°F. If the return or zone temperature is more than 3°F below the reset temperature setpoint the amount of reset is equal to the reset amount setpoint.

Zone Temperature Control

Unoccupied Zone Cooling

During unoccupied mode, the unit is operated as a CV unit. VAV boxes are driven full open and the supply fan is commanded to full speed. The unit controls zone temperature to the Unoccupied zone cooling setpoints.

Daytime Warm-up

During occupied mode, if the zone temperature falls to a temperature three degrees below the Morning Warm-up setpoint, Daytime Warm-up is initiated. The system changes to CV heating (full unit airflow), the VAV boxes are fully opened and the CV heating algorithm is in control until the Morning Warm-up setpoint is reached. The unit is then returned to VAV cooling mode. The Morning Warm-up setpoint is set at the unit mounted VAV Setpoint potentiometer or at a remote panel.

Morning Warm-up (MWU)

Morning warm-up control (MWU) is activated whenever the unit switches from unoccupied to occupied and the zone temperature is at least 1.5°F below the MWU setpoint. When MWU is activated the VAV box output will

be energized for at least 6 minutes to drive all boxes open, the supply fan is commanded to full speed, and full heat (gas or electric) is energized. When MWU is activated the economizer damper is driven fully closed. When the zone temperature meets or exceeds the MWU setpoint minus 1.5°F, the heat will be turned or staged down. When the zone temperature meets or exceeds the MWU setpoint then MWU will be terminated and the unit will switch over to VAV cooling.

Variable Air Volume Applications (Single Zone VAV)

Supply Fan Output Control

Units configured for Single Zone VAV will be controlled via the 0-10Vdc Indoor Fan Speed output located on the RTOM. R136 (DA COOL_FAN SPD) potentiometer on the RTOM sets the maximum motor speed. Note that the potentiometer voltage readings can be verified via 2-position harness connector located adjacent to the RTOM. The unit schematic will illustrate the exact location. Use a DC voltmeter to read the voltage between the two terminals. Reference the RPM table in the Performance Data section for fan speed.

- Use Service TEST Mode to adjust maximum motor speed using modes listed below.

1. TEST Mode Cool 2; 2-Step Cool applications only
2. TEST Mode Cool 3; 3-Step Cool applications only

- Adjust DA COOL_FAN SPD potentiometer clockwise to increase or counterclockwise to decrease motor speed.
- The control will scale the 0-10Vdc output from the RTOM linearly to control between the 50%-100% controllable range based on the space cooling demand.

Minimum Supply Fan Output

- Refer to the table below for details on minimum supply fan output signals associated with each unit function.
- Minimum Fan Output%
- Ventilation Only 50%
- Economizer Cooling 65%
- Cool 1 (C1 Energized) 65%
- Cool 2 (C1 + C2) 82% (2-Steps of Cooling)
- Cool 2 (C1 or C2) 65% (3-Steps of Cooling)
- Cool 3 (C1 + C2 Energized) 82%
- Heat 100%

Discharge Air Cool Setpoint Adjustment

- Single Zone VAV units will require traditional zone heating (if heat installed) and cooling setpoints that are used on single speed units in addition to a new setpoint: Discharge Air Cool Setpoint limit. Discharge Air Cool Setpoints will be customer selectable via a potentiometer (DACR) adjacent to the RTOM with a range of 40- 70°F.
- The table below lists the discharge air cool setpoints on the DACR.

Note: *The recommended setting is 50°F.*

Table 12. Discharge air cool setpoints (DACR)

Setpoint (°F)	Voltage (Vdc)
40 - <0.1	55 - 1.65
41 - 0.2	56 - 1.7
42 - 0.3	57 - 1.75
43 - 0.45	58 - 1.83
44 - 0.55	59 - 1.9
45 - 0.7	60 - 1.95
46 - 0.8	61 - 2
47 - 0.95	62 - 2.05
48 - 1.05	63 - 2.1
49 - 1.15	64 - 2.13
50 - 1.25	65 - 2.17
51 - 1.3	66 - 2.21
52 - 1.35	67 - 2.27
53 - 1.45	68 - 2.3
54 - 1.55	69 - 2.35
70 - >2.4	

ReliaTel™ Control Cooling with an Economizer

The economizer is utilized to control the zone temperature providing the outside air conditions are suitable. Outside air is drawn into the unit through modulating dampers. When cooling is required and economizing is possible, the RTRM sends the cooling request to the unit economizer actuator (ECA) to open the economizer damper. The RTRM tries to cool the zone utilizing the economizer to slightly below the zone temperature setpoint. If the mixed air sensor (MAS) senses that the mixed air temperature is below 53°F, the damper modulates toward the closed position. If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is full open, the RTRM energizes the compressor contactor (CC1). If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is fully open, the RTRM energizes the compressor contactor (CC2).

Multi-Speed Fan

When economizing alone or with 1st stage cooling the indoor motor will operate at low speed. If economizing and 2nd stage cooling requested, the indoor motor will transition from low to high speed.

Single Zone VAV

The indoor motor will vary the indoor motor speed to optimize minimum fan speed for the cooling demand in all

modes (Economizer Only, Economizer +1st Stage Cooling, or Economizer + 1st/2nd Stage Cooling).

The ECA continues to modulate the economizer damper open/closed to keep the mixed air temperature that is calculated by the RTRM.

If economizing is not possible, the ECA drives the damper to the minimum position setpoint when the indoor fan relay (F) is energized and allows mechanical cooling operation.

When the unit is equipped with the optional fan failure switch, wired between terminals J7-5 and J7-6 on the RTOM, the RTRM will stop all cooling functions and produce an analog output if the fan failure switch (FFS) does not open within 40 seconds after a request for fan operation. When the system is connected to a remote panel, the "SERVICE" LED will flash when this failure occurs.

ReliaTel™ Control Dehumidification

Single Compressor Units

On a call for dehumidification, the reheat valve is energized and the compressor is turned on. When the humidity control setpoint is satisfied, the valve is de-energized and the compressor is turned off. If there is a call for cooling or heating from the space temperature controller, i.e. zone sensor or thermostat, while in reheat, the reheat valve is de-energized and the compressor continues to run, or the heat is turned on. The 3 minute compressor on and off times are still active during compressor operation.

Dual Compressor Units

The dehumidification cycle is only permitted above 40°F and below 100°F and is not permitted during a heating cycle or during a demand for 2nd stage cooling. Otherwise, when an installed zone humidity sensor indicates a relative humidity equal to or greater than the RH set point as adjusted on the ReliaTel™ options module (RTOM), a dehumidification cycle is initiated. The sequence of operation for the dehumidification cycle is identical to that of the second stage ReliaTel™ cooling cycle, except that the hot gas reheat valve (RHV) is energized, allowing air from the evaporator to be reheated. Also, any installed fresh air damper is driven to minimum position.The dehumidification cycle is terminated by initiation of a heating cycle or a 2nd stage cooling cycle or when zone humidity is reduced to 5% below the R.H. set point. In the absence of a zone humidity sensor input, an on/off input from a zone humidistat is used to initiate/terminate the dehumidification cycle.

Dehumidification takes priority over a call for one-stage cooling.

Heating or two-stage cooling takes priority over dehumidification, and a relative humidity sensor takes priority over a humidistat.

Dehumidification Coil Purge Cycle

On multiple circuit units with dehumidification/reheat configured, a purge cycle will be active for compressor reliability. The purpose of this function is to properly distribute refrigerant and lubricant throughout the system by temporarily switching to the unused section of the coil for 3 minutes (purge cycle). The function operates as follows:

1. A purge cycle will be initiated after 90 minutes of accumulated compressor run time in only one mode: cooling or dehumidification, without transitioning to the other mode.
2. A purge cycle will consist of transitioning to the mode that hasn't run in 90 minutes of total compressor operation. The cycle will last for a period of 3 minutes.
3. The 90-minute cycle count will be reset anytime there is a normal transition between cooling and dehumidification. Transitioning from one of these modes to any other mode (off or heat) will not reset the counter.
4. If the purge cycle is a cooling cycle, only the first circuit will be activated. If it is a dehumidification cycle then the normal 2-compressor dehumidification mode cycle will be used.
5. The purge cycle will ignore the low ambient dehumidification lockout feature.
6. A purge cycle takes priority over normal cooling or dehumidification requests, but will discontinue for all high priority lockouts and alarms.

ReliaTel™ Control Cooling with an Economizer

The economizer is utilized to control the zone temperature providing the outside air conditions are suitable. Outside air is drawn into the unit through modulating dampers. When cooling is required and economizing is possible, the RTRM sends the cooling request to the unit economizer actuator (ECA) to open the economizer damper. The RTRM tries to cool the zone utilizing the economizer to slightly below the zone temperature setpoint. If the mixed air sensor (MAS) senses that the mixed air temperature is below 53°F, the damper modulates toward the closed position. If the zone temperature continues to rise above the zone temperature setpoint control band and the economizer damper is full open for 5 minutes, the RTRM energizes the compressor contactor (CC1). If the zone temperature continues to rise above the zone temperature setpoint control band and the economizer damper is fully open, the RTRM energizes the compressor contactor (CC2).

The ECA continues to modulate the economizer damper open/closed to keep the mixed air temperature that is calculated by the RTRM.

If economizing is not possible, the ECA drives the damper to the minimum position setpoint when the indoor fan

relay (F) is energized and allows mechanical cooling operation.

When the unit is equipped with the optional fan failure switch, wired between terminals J7-5 and J7-6 on the RTOM, the RTRM will stop all cooling functions and produce an analog output if the fan failure switch (FFS) does not open within 40 seconds after a request for fan operation. When the system is connected to a remote panel, the "SERVICE" LED will flash when this failure occurs.

Note: *For units equipped with the dehumidification option, if the unit is economizing, the damper resets to minimum position while in dehumidification mode.*

Economizer Set-Up

Adjusting the minimum position potentiometer located on the unit economizer actuator (ECA) sets the required amount of ventilation air.

Two of the three methods for determining the suitability of the outside air can be selected utilizing the enthalpy potentiometer on the ECA, as described below:

1. Ambient temperature - controlling the economizing cycle by sensing the outside air dry bulb temperature. The following table lists the selectable dry bulb values by potentiometer setting.
2. Reference enthalpy - controlling the economizer cycle by sensing the outdoor air humidity. The following table lists the selectable enthalpy values by potentiometer setting. If the outside air enthalpy value is less than the selected value, the economizer is allowed to operate.
3. Comparative enthalpy - utilizing a humidity sensor and a temperature sensor in both the return air stream and the outdoor air stream, the unit control processor (RTRM) will be able to establish which conditions are best suited for maintaining the zone temperature, i.e. indoor conditions or outdoor conditions. The potentiometer located on the ECA is non-functional when both the temperature and humidity sensors are installed.

Table 13. Potentiometer settings

Potentiometer Setting	Dry Bulb	Reference Enthalpy
A	73°F (22.8°C)	27 Btu/lb (63 kJ/kg)
B	70°F (21.1°C)	25 Btu/lb (58 kJ/kg)
C	67°F[(a)] (19.4°C)	23 Btu/lb (53 kJ/kg)
D	63°F (17.2°C)	22 Btu/lb (51 kJ/kg)
E	55°F (12.8°C)	19 Btu/lb (44 kJ/kg)

(a) Factory settings

ReliaTel™ Control Heating Operation (for Cooling Only Units)

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint control band, the RTRM energizes (K1) relay coil. When the (K1) relay contacts close, located on the RTRM, the first stage electric heat contactor (AH or AH & CH) is energized.

If the first stage of electric heat can not satisfy the heating requirement, the RTRM energizes (K2) relay coil. When the (K2) relay contacts close, located on the RTRM, the second stage electric heat contactor (BH) is energized, if applicable. The RTRM cycles both the first and second stages of heat "On" and "Off" as required to maintain the zone temperature setpoint.

ReliaTel™ Control Heating Operation (for Gas Units)

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint control band, a heat cycle is initiated when the RTRM communicates ignition information to the Ignition module (IGN).

Ignition Module

Two-stage (IGN) runs self-check (including verification that the gas valve is de-energized). (IGN) checks the high-limit switches (TC01 & TC02) for normally closed contacts, the pressure switch (PS) for normally open contacts, and the flame rollout (FR) switch for continuity. (IGN) energizes inducer blower on high speed to check pressure switch closure. If the pressure switch is closed, the inducer blower starts a 20-second pre-purge (15 seconds on high speed followed by 5 seconds on low speed). If the pressure switch (PS) is still open, the inducer blower will continue to be energized on high speed until pressure switch closure. After pre-purge completes, the (IGN) energizes the first stage of the gas valve, initiates spark for 2 seconds minimum, 7 seconds maximum (ignition trial) and detects flame and de-energizes spark. From this point, a fixed 45 second indoor blower delay on timing starts. After the indoor blower delay on is completed, the (IGN) energizes the indoor blower. The (IGN) enters a normal operating loop where all inputs are continuously monitored. If the first stage of gas heat can not satisfy the heating requirement, the thermostat closes W2. The (IGN) energizes the second stage of the gas valve and the second stage of inducer blower. When the zone thermostat is satisfied, the (IGN) de-energizes the gas valve. The (IGN) senses loss of flame. The (IGN) initiates a 5 second inducer blower post purge. The (RTRM) initiates a second indoor blower delay off.

If the burner fails to ignite, the ignition module will attempt two retries before locking out. The green LED will indicate a lock out by two fast flashes. An ignition lockout can be reset by;

1. Opening for 3 seconds and closing the main power disconnect switch.

2. Switching the "Mode" switch on the zone sensor to "OFF" and then to the desired position.
3. Allowing the ignition control module to reset automatically after one hour. Refer to the "Ignition Control Module Diagnostics" section for the LED diagnostic definitions.

When the fan selection switch is set to the "Auto" position, the RTRM energizes the indoor fan relay (F) coil approximately 30 second after initiating the heating cycle to start the indoor fan motor (IDM).

Table 14. Ignition module diagnostics

Steady light	Module is powered up, but no active call for heat.
Blinking at continuous steady rate	Active call for heat.
One blink	Loss of communication.
Two blinks	System lockout (failure to ignite, no spark, low/ no gas pressure, etc.)
Three blinks	Pressure switch (no vent air flow, bad CBM, closed at initial call for heat). Auto reset.
Four blinks	High limit (excessive heat in combustion chamber, low airflow). Auto reset.
Five blinks	Flame sensed and gas valve not energized or flame sensed and no call for heat.
Six blinks	Flame rollout (CBM failure, incorrect gas pressure, incorrect primary air). Requires manual reset of the switch.
Seven blinks	ReliaTel™ module will communicate a heat fail diagnostic back to the RTRM.

Drain Pan Condensate Overflow Switch (Optional)

This input incorporates the condensate overflow switch (COF) mounted on the drain pan and the ReliaTel™ options module (RTOM). When the condensate level reaches the trip point for 6 continuous seconds, the RTOM will shut down all unit function until the overflow condition has cleared. The unit will return to normal operation after 6 continuous seconds with the COF in a non-tripped condition. If the condensate level causes the unit to shutdown more than 2 times in a 3 day period, the unit will be locked-out of operation. A manual reset of the diagnostic system through the zone sensor or Building Automation System (BAS) will be required. Cycling unit power will also clear the fault.

Electromechanical Controls

These units are offered with two control options, electromechanical and ReliaTel™ controls. The ReliaTel™ controls is a microelectronic control feature, which provides operating functions that are significantly different than conventional electromechanical units.

Electromechanical Control Cooling without an Economizer

When the thermostat switch is set to the "Cool" position and the zone temperature rises above the cooling setpoint, the thermostat Y contacts close. The compressor contactor (CC1) coil is energized provided the low pressure control (LPC1), high pressure control (HPC1) and discharge line thermostat (TDL 1) are closed. When the (CC1) contacts close, compressor (CPR1) and the outdoor fan motor (ODM) start. If the first stage of cooling can not satisfy the cooling requirement, the thermostat closes Y2. The compressor contactor (CC2) coil is energized provided the low pressure control (LPC2), high pressure control (HPC2) and discharge line thermostat (TDL 2) are closed.

When the (CC2) contacts close, compressor (CPR2) starts.

Electromechanical Control Evaporator Fan Operation (for Gas Units)

When the thermostat fan selection switch is set to the "Auto" position, the Ignition Module (IGN) energizes the indoor fan relay (F) approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the Ignition Module (IGN) energizes the indoor fan relay (F) coil approximately 45 second after gas ignition. Closing indoor fan relay (F) coil starts the indoor fan motor (IDM). The (IGN) de-energizes the fan relay (F) approximately 80 seconds after the cooling requirement has been satisfied to enhance unit efficiency.

When the heating cycle is terminated, the indoor fan relay (F) coil is de-energized approximately 90 seconds after the heating requirement.

When the thermostat fan selection switch is set to the "On" position, the (IGN) keeps the indoor fan relay coil (F) energized for continuous fan motor operation.

Electromechanical Evaporator Fan Operation (for Cooling Only Units)

When the thermostat fan selection switch is set to the "Auto" position, the thermostat energizes the indoor fan relay coil (F) to start the indoor fan motor (IDM). The fan relay (F) de-energizes after the cooling requirement has been satisfied. When the heating cycle is terminated, the indoor fan relay (F) coil is de-energized with heater contactors.

When the thermostat fan selection switch is set to the "On" position, the thermostat keeps the indoor fan relay coil (F) energized for continuous fan motor operation.

Economizer Set-Up

Adjusting the minimum position potentiometer located on the unit economizer actuator (ECA) sets the required amount of ventilation air.

Ambient temperature is controlling the economizing cycle by sensing the outside air dry bulb temperature. The

following table lists the selectable dry bulb values by potentiometer setting.

Table 15. Potentiometer settings

Potentiometer Setting	Dry Bulb	Reference Enthalpy
A	73°F (22.8°C)	27 Btu/lb (63 kJ/kg)
B	70°F (21.1°C)	25 Btu/lb (58 kJ/kg)
C	67°F[(a)] (19.4°C)	23 Btu/lb (53 kJ/kg)
D	63°F (17.2°C)	22 Btu/lb (51 kJ/kg)
E	55°F (12.8°C)	19 Btu/lb (44 kJ/kg)

(a) Factory settings

Electromechanical Control Cooling with an Economizer

The economizer is utilized to control the zone temperature providing the outside air conditions are suitable. Outside air is drawn into the unit through modulating dampers.

When cooling is required and economizing is possible, the unit economizer actuator (ECA) opens the economizer damper. The ECA continues to modulate the economizer damper open/closed to keep the mixed air temperature in the 50°F to 55°F range.

The thermostat will close the Y2 contacts to turn on contactor (CC1) if mechanical cooling is required.

If economizing is not possible, the ECA drives the damper to the minimum position setpoint when the indoor fan relay (F) is energized and allows mechanical cooling operation.

Electromechanical Control Heating Operation (for Cooling Only Units)

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint, the thermostat closes W1 contacts the first stage electric heat contactor (AH or AH & CH) is energized. If the first stage of electric heat can not satisfy the heating requirement, the thermostat closes W2.
When the W2 contacts close, the second stage electric heat contactor (BH) is energized, if applicable. The thermostat cycles both the first and second stages of heat "On" and "Off" as required to maintain the zone temperature setpoint.

Electromechanical Control Heating Operation (for Gas Units)

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint, the Ignition module (IGN) initiates a heat cycle.

Ignition Module Low, Medium and High Heat

Two-stage (IGN) runs self-check (including verification that the gas valve is de-energized). (IGN) checks the high-limit switches (TC01 & TC02) for normally closed contacts, the pressure switch (PS) for normally open contacts, and the flame rollout (FR) switch for continuity. (IGN) energizes inducer blower on high speed to check pressure switch closure.

If the pressure switch is closed, the inducer blower starts a 20 second pre-purge (15 seconds on high speed followed by 5 seconds on low speed).

If the pressure switch (PS) is still open, the inducer blower will continue to be energized on high speed until pressure switch closure.

After pre-purge completes, the (IGN) energizes the first stage of the gas valve, initiates spark for 2 seconds minimum, 7 seconds maximum (ignition trial) and detects flame and de-energizes spark. From this point, a fixed 45 second indoor blower delay on timing starts.

After the indoor blower delay on is completed, the (IGN) energizes the indoor blower. The (IGN) enters a normal operating loop where all inputs are continuously monitored. If the first stage of gas heat can not satisfy the heating requirement, the thermostat closes W2. The (IGN) energizes the second stage of the gas valve and the second stage of inducer blower.

When the zone thermostat is satisfied, the (IGN) de-energizes the gas valve. The (IGN) senses loss of flame. The (IGN) initiates a 5 second inducer blower post purge and 90 second indoor blower delay off at current speed. The (IGN) de-energizes the inducer blower at the end of the post purge. The (IGN) de-energizes the indoor blower at the end of the selected indoor blower delay off.

Table 16. Ignition module diagnostics

Steady light	Module is powered up, but no active call for heat.
Blinking at continuous steady rate	Active call for heat.
One blink	Loss of communication.
Two blinks	System lockout (failure to ignite, no spark, low/no gas pressure, etc.)
Three blinks	Pressure switch (no vent air flow, bad CBM, closed at initial call for heat). Auto reset.
Four blinks	High limit (excessive heat in combustion chamber, low airflow). Auto reset.
Five blinks	Flame sensed and gas valve not energized or flame sensed and no call for heat.
Six blinks	Flame rollout (CBM failure, incorrect gas pressure, incorrect primary air). Requires manual reset of the switch.
Seven blinks	W1& W2 swapped (electromechanical 3-10 tons units).

Drain Pan Condensate Overflow Switch (Optional)

The condensate overflow switch (COF) is utilized to prevent water overflow from the drain pan. The float switch is installed on the corner lip of the drain pan. When the condensate level reaches the trip point, the COF relay

energizes and opens the 24VAC control circuit which disables the unit. Once the 24VAC control circuit is opened, a delay timer will prevent unit start-up for three minutes.

Verifying Proper Air Flow

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

Units with 5-Tap Direct Drive Indoor Fan

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil.

The indoor fan motor is factory wired to operate on speed tap 1 in the cooling and heating mode for electric/electric units. For Gas/Electric units, the motor is factory wired to operate on speed tap 1 during cooling. For 3 & 4 ton Gas/Electric units operating in heat mode, the minimum setting is Tap 4.

For these units, a separate tap terminal is provided to change speeds automatically between heating and cooling. The motor can be rewired for different speed settings should the application require it. Refer to the wiring diagram that shipped in the unit and the unit fan performance tables in the Service Facts.

The indoor fan motors are specifically designed to operate within the BHP parameters listed in the fan performance tables of the unit Service Facts.

When verifying direct drive fan performance, the tables must be used somewhat differently than those of belt driven fans. Fan performance diagnostics can be easily recognized when these tables are used correctly.

Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0% using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel™ Control: Using the Service Test Guide in Table 11, p. 48, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Electromechanical Control: Using the Service Test Guide perform the proper test mode connections.

With the fan operating properly, determine the total system external static pressure (inches w.c.) by the following method (ReliaTel/Electromechanical):

1. Measure the supply and return duct static pressure and sum the resulting absolute values,
2. Use the accessory pressure drop table in the Service Facts, to calculate the total static pressure drop for all of the accessories installed on the unit; i.e., curb, economizer, etc.

Note: *Accessory static pressure drop is based on desired CFM and may not be actual static pressure drop.*

3. Add the total accessory static pressure drop (step 2) to the duct external static pressure (step 1). The sum of these two values represents the total system external static pressure.

Using the Fan Performance Tables in the Service Facts, look up the selected speed tap setting and match the measured ESP to determine the approximate CFM.

If the required CFM is too low, (external static pressure is high) do one or both of the following and repeat procedure:

a. Relieve supply and/or return duct static.

b. Change indoor fan speed tap to a higher value

If the required CFM is too high, (external static pressure is low), do one or both of the following and repeat procedure:

c. Increase supply and/or return duct static.

d. Change indoor fan speed tap to a lower value.

Note: *Minimum setting for units with gas or electric heat is 320 CFM per ton. For 3 & 4 ton gas Heat units operating in heating mode the heat speed set cannot be lower than speed Set 4.*

4. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure.

Units with Belt Drive Indoor Fan

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil.

The indoor fan speed is changed by opening or closing the adjustable motor sheave.

Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0% using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel™ Control: Using the Service Test Guide in Table 11, p. 48, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Electromechanical Control: Using the Service Test Guide perform the proper test mode connections.

Once the supply fan has started, check for proper rotation. The direction of rotation is indicated by an arrow on the fan housing.

With the fan operating properly, determine the total system airflow (CFM) by (ReliaTel™/Electromechanical):

1. Measuring the actual RPM.
2. Measure the amperage at the supply fan contactor and compare it with the full load amp (FLA) rating stamped on the motor nameplate.
   a. Calculate the theoretical BHP using (Actual Motor Amps/ Motor Nameplate Amps) X Motor HP.
   b. Using the fan performance tables in the unit Service Facts, plot the actual RPM (step 1) and the BHP (step 2a) to obtain the operating CFM.
3. If the required CFM is too low, (external static pressure is high causing motor HP output to be below table value),
   a. Relieve supply and/or return duct static.
   b. Change indoor fan speed and repeat Step 1 and Step 2.
   - To Increase Fan RPM; Loosen the pulley adjustment set screw and turn sheave clockwise.
   - To Decrease Fan RPM; Loosen the pulley adjustment set screw and turn sheave counterclockwise.
   - If the required CFM is too high, (external static pressure is low causing motor HP output to be above table value), change indoor fan speed and repeat Step 1 and Step 2.
   - To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure.

Units with Direct Drive Indoor Fan - Electromechanical Control

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil. The indoor fan speed is changed by adjusting the output voltage from the MMC/ECM board to the direct drive fan. Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0 percent using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel™ Units with Direct Drive Indoor Fan (10 Ton Standard Efficiency, 6(074) to 10 Ton High Efficiency, and optional 7.5 (092) to 8.5 Ton Standard Efficiency)

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil. The indoor fan speed is changed by adjusting the voltage from the RTOM Indoor Fan Speed output to the direct drive plenum fan. If installed, before starting the SERVICE TEST disable the Economizer by disconnecting the 4 pin power connector located at the base of the Economizer Control (ECA).

Using the Service Test Guide in Table 11, p. 48, momentarily jump across the Test 1 & Test 2 terminals on LTB1. Repeat process until Service Test Mode is at Cool 2 (2-Steps of Cooling Applications Only) or Cool 3 (3-Steps of Cooling applications). The indoor motor shall be operating @ 100%, to verify turn DA COOL_FAN SPD potentiometer full clockwise, voltage should read ~7.5 Vdc across harness test terminals. The Unit schematic illustrates location for measuring the indoor motor speed voltage.

Table 17. Direct drive plenum fan settings (rpm vs. voltage)

Potentiometer Voltage	Motor RPM
1	N/A
1.25	N/A
1.5	N/A
1.75	N/A
2	N/A
2.25	325
2.5	402
2.75	465
3	544
3.25	630
3.5	716
3.75	775
4	845
4.25	912
4.5	976
4.75	1044
5	1115
5.25	1203
5.5	1253
5.75	1312
6	1368
6.25	1425
6.5	1475
6.75	1533
7	1581
7.25	1615
7.5	1615

Once the supply fan has started, determine the total system airflow (CFM)

1. Measure the DC voltage across harness test terminals. Using the fan rpm table shown above, determine RPM correlated to measured voltage.

Sequence of Operation

2. If the required CFM is too low, (external static pressure is high causing motor HP output to be below table value),

a. Relieve supply and/or return duct static.

b. Change indoor fan speed and repeat Step 1 and Step 2.

- To Increase/Decrease Fan RPM turn DA COOL_FAN SPD on the RTOM clockwise/counter-clockwise.

3. If the required CFM is too high, (external static pressure is low causing motor HP output to be above table value), change indoor fan speed and repeat repeat Step 1 and Step 2.

- Stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position and reconnect Economizer 4-pin power connector if disconnected for this procedure.

Proceed to the next component start-up procedure.

Electromechanical Control: Using the Service Test Guide perform the proper test mode connections.

Once the supply fan has started, determine the total system airflow (CFM) by (ReliaTel™/Electromechanical):

4. Measure the amperage at the supply fan contactor and compare it with the full load amp (FLA) rating for the evaporator motor stamped on the unit nameplate.
   a. Calculate the theoretical BHP using (Actual Motor Amps/Motor Nameplate Amps) X Motor HP
   b. Using the fan performance tables in the unit Service Facts, plot the actual RPM (step 1) and the BHP (step 2a) to obtain the operating CFM.
5. If the required CFM is too low, (external static pressure is high causing motor HP output to be below table value),
   a. Relieve supply and/or return duct static.
   b. Change indoor fan speed and repeat steps 1 and 2.

- For ECM board: To Increase/Decrease Fan RPM:
  a. Push and hold the SET button for 3 sec. Board will display Motor 1 parameter name: Hi 1.
  b. Slow push SET again to display the parameter's current value =7.50 volts.
  c. Push on + or – button to adjust parameter to desired value = XXX volts.
  d. Push and hold SET button for 3 sec to "save" the value. After save is complete, Hi 1 will show again.
  e. After the voltage Hi 1 is successfully changed, the display sequence will be:

MTR 1---> XXX -----> MTR2 -----> 0.00----->FST1---->ON/OFF----->FST2------>ON/OFF------->EhEn-- --->ON/OFF

The motor will ramp up or down to adjust to the input signal. Using the fan rpm table above, determine RPM correlated to displayed voltage.

- If the required CFM is too high, (external static pressure is low causing motor HP output to be above table value), change indoor fan speed and repeat steps 1 and 2.
- To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure.

Units with Constant CFM Direct Drive Indoor Fan

Much of the systems performance and reliability is closely associated with, and dependent upon having the proper airflow supplied both to the space that is being conditioned and across the evaporator coil. The indoor fan provides a constant CFM base on voltage output for the potentiometer on the RTOM board. Before starting the SERVICE TEST, set the minimum position setpoint for the economizer to 0 percent using the setpoint potentiometer located on the Economizer Control (ECA), if applicable.

ReliaTel Control. Using the Service Test Guide in Table 11, p. 48, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test.

Once the supply fan has started, determine the total system airflow (CFM) by:

1. Measure the DC voltage across pins TP1 and ground (screw on corner of RTOM board). Lookup desired CFM using the voltage CFM table shown on the access panel label or in the unit Service Facts; record corresponding voltage. Adjust potentiometer until output voltage across TP1 and ground achieves desired CFM setpoint.
2. To increase voltage/CFM, turn potentiometer clockwise.
3. To decrease voltage/CFM, turn potentiometer counter-clockwise.

Note: *With ID fan access panel removed, fan will operate at lower RPM due to the decrease in pressure. Once panel is installed, RPM will increase.*

17 Plus units with the constant CFM direct drive indoor fan

Proper airflow is critical to unit operation. All 17 Plus Precedent units (037, 047, and 067 units) use an indoor fan that provides a constant CFM. There are two different types of 17 Plus Precedent units: Single Zone VAV units and Multi Speed units. Both types of units use the same type of indoor motor and the same airflow adjustment procedure.

To adjust airflow on a 17 Plus unit the Service Test mode must be used for accurate results. Additionally, airflow adjustments should be made in either "Cool Stage 2" or any stage of heat because the fan is driven to its maximum setting during these stages. Only the maximum fan setting requires adjustment, all other fan speeds follow the maximum adjustment and do not require any adjustment.

Using the Service Test Guide in Table 11, p. 48, enter the unit into either "Cool Stage 2" or any stage of heat by using either the "Step Test Mode" or "Resistance Test Mode".

Once the unit is in either "Cool Stage 2" or any stage of heat, system airflow (CFM) is determined by:

1. In the indoor fan compartment, locate the R136 potentiometer on the RTOM circuit board (also designated "DA COOL - FAN SPD"). Also, locate the TP1 test pin loop next to the R136 potentiometer.
2. Measure the DC Voltage across the test pin TP1 and unit chassis ground. Compare DC voltage to the CFM chart shown in Table 18, p. 61. Table 18, p. 61 shows what DC voltage corresponds to CFM per ton of unit cooling.

   Note: *If 1200 cfm is required from a 3 ton unit (037) the R136 potentiometer should be adjusted so that the DC voltage measured at TP1 to ground reads 1.65 volts DC.*
3. To increase the TP1 voltage, turn the R136 potentiometer clockwise.
4. To decrease the TP1 voltage, turn the R136 potentiometer counter-clockwise.

Note: *With the indoor fan access panel removed, the fan will operate at a lower RPM because static pressure is reduced with the door open. Once the panel is returned the RPM of the indoor fan will increase.*

Table 18. Cfm vs. vdc

PWM% value	Potentiometer Voltage (vdc)	CFM/Ton
70	<0.1	320
75	0.7	347
80	1.25	373
85	1.65	400
90	1.95	427
95	2.17	453
100	>2.4	480

Variable Air Volume Applications (Traditional VAV)

Supply Air Temperature Control - Occupied Cooling and Heating

The RTRM is designed to maintain a selectable supply air temperature of 40°F to 90°F with a +/- 3.5°F deadband. In cooling, if supply air temperature is more than 3.5 degrees warmer than the selected temperature, a stage of cooling will be turned "On" (if available). Then if the supply air temperature is more than 3.5° cooler than the selected temperature, a stage of cooling will be turned "Off". At very low airflows the unit may cycle stages "On" and "Off" to maintain an average discharge air temperature outside the 7° deadband. During low load or low airflow conditions the actual temperature swing of the discharge air will likely be greater. The RTRM utilizes a proportional and integral control scheme with the integration occurring when the supply air temperature is outside the deadband. As long as the supply air temperature is within the setpoint deadband, the system is considered to be satisfied and no staging up or down will occur.

Note: *The RTRM is designed to maintain a selectable supply air temperature of 40°F to 90°F with a +/- 3.5°F deadband. However, to reduce the risk of evaporator coil freeze-up in Precedent and Voyager Light Commercial applications, supply air temperature should not be set below 50° F.*

Supply Air Temperature Control with an Economizer

The economizer is utilized to control the supply air cooling at +1.5°F around the supply air temperature setpoint range of 40°F and 90°F providing the outside air conditions are suitable. To reduce the risk of evaporator coil freeze-up supply air temperature should not be set below 50° F. While economizing, the mechanical cooling is disabled until the economizer dampers have been fully open for three minutes. If the economizer is disabled due to unsuitable conditions, the mechanical cooling will cycle as though the unit had no economizer.

Note: *The RTRM is designed to maintain a selectable supply air temperature of 40°F to 90°F with a +/- 3.5°F deadband. However, to reduce the risk of evaporator coil freeze-up in Precedent and Voyager Light Commercial applications, supply air temperature should not be set below 50°F.*

VHR Relay Output

During unoccupied mode, daytime warm-up (DWU), morning warm-up (MWU) and heating mode the Supply Fan will operate at 100% of user set maximum airflow. All VAV boxes must be opened through an ICS program or by the VHR wired to the VAV boxes. The RTRM will delay 100% fan operation approximately 6.5 minutes when switching from occupied cooling mode to a heating mode.

Zone Temperature Control without a Night Setback Panel or ICS - Unoccupied Cooling

When a field supplied occupied/unoccupied switching device is connected between RTRM J6-11 and RTRM J6-12, both the economizer and the mechanical cooling will be disabled.

Zone Temperature Control without a Night Setback Panel or ICS - Unoccupied Heating

When a field supplied occupied/unoccupied switching device is connected between RTRM J6-11 and J6-12 and DWU is enabled, the zone temperature will be controlled at 10°F below the Morning Warm-up setpoint, but not less than 50°F, by cycling one or two stages of either gas or electric heat, whichever is applicable.

Sequence of Operation

Morning Warm-up (MWU) Control

Morning Warm-up is activated if the zone temperature is at least 1.5°F below the MWU setpoint whenever the system switches from Unoccupied to Occupied status. The MWU setpoint may be set from the unit mounted potentiometer or a remotely mounted potentiometer. The setpoint ranges are from 50°F to 90°F. When the zone temperature meets or exceeds the MWU setpoint, the unit will switch to the "Cooling" mode. The economizer will be held closed during the morning warm-up cycle.

Daytime Warm-up (DWU) Control

Daytime Warm-up is applicable during occupied status and when the zone temperature is below the initiation temperature. It can be activated or deactivated through ICS or a night setback zone sensor. If ICS or a night setback zone sensor is not utilized, DWU can be activated by setting the DWU enable DIP switch (RTAM) to ON and supplying a valid morning warm-up setpoint.

The unit is shipped with a Morning Warm-up setpoint configured and the Daytime Warm-up function is activated (switch on). Opening the DWU enable switch will disable this function.

If the system control is local, the DWU initiation setpoint is 3°F below the Morning Warm-up setpoint. The termination setpoint is equal to the Morning Warm-up setpoint.

If the system control is remote (Tracer™), the DWU setpoint is equal to the Tracer Occupied heating setpoint. The initiation and termination setpoints are selectable setpoints designated by Tracer.

When the zone temperature meets or exceeds the termination setpoint while the unit is in an Occupied, "Auto" Mode or switched to the "Cooling" Mode, the unit will revert to the cooling operation.

If an Occupied "Heating" Mode is selected, the unit will only function within the DWU perimeters until the system

is switched from the "Heat" Mode or enters an Unoccupied status.

Note: *When a LCI is installed on a VAV unit, the MWU setpoint located on the RTAM board is ignored. The MWU and DWU setpoints come from the higher priority LCI-R DAC.*

Supply Duct Static Pressure Control

The supply duct static pressure is measured by a transducer with a 0.25 to 2.125 Vdc proportional output which corresponds to an adjustable supply duct static pressure of 0.3" w.c. to 2.5" w.c. respectively with a deadband adjustment range from 0.2" w.c. to 1.0" w.c. The setpoint is adjustable on the RTAM Static Pressure Setpoint potentiometer or through ICS.

Traditional VAV Standalone Operation

If a traditional VAV unit is required to operate without ICS, BAS or other "front end" controller, a jumper must be placed between J6-2 and J6-4 of the RTRM to allow local standalone control.

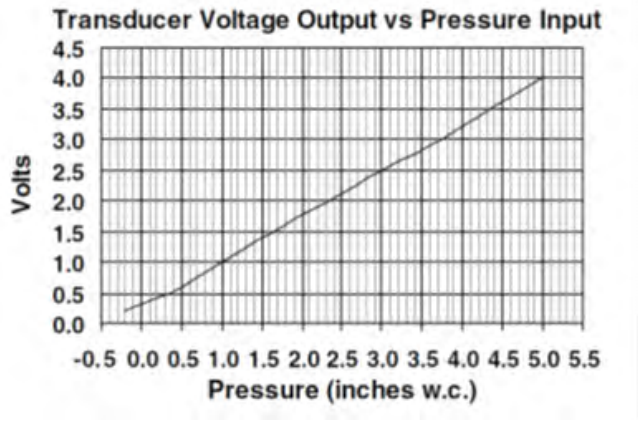
Example:

Supply Duct Static setpoint = 2.0" w.c. (RTAM)

Deadband = 0.2" w.c. (RTAM)

Duct Static Control Range = 1.9" w.c. to 2.1" w.c.

Figure 69. Transducer voltage output vs. pressure input



Supply Air Temperature Reset

The supply air temperature can be reset by using one of four DIP switch configurations on the RTAM or through ICS when a valid supply air reset setpoint with a supply air reset amount is given. A selectable reset amount of 0° F to 20°F via RTAM potentiometer or ICS is permissible for each type of reset.

The amount of change applied to the supply air temperature setpoint depends on how far the return air, zone, or outdoor air temperature falls below the reset temperature setpoint. If the return air, zone, or outdoor air temperature is equal to or greater than the reset temperature setpoint, the amount of change is zero.

If the return air, or zone temperature falls 3°F below the reset temperature setpoint, the amount of reset applied to the supply air temperature will equal the maximum amount of reset selected.

If the outdoor air temperature falls 20°F below the reset temperature setpoint, the amount of reset applied to the supply air temperature will equal the maximum amount of reset selected. The four DIP switch configurations are as follows:

1. None - When RTAM DIP Switch #3 and #4 are in the "Off" position, no reset will be allowed.
2. Reset based on Return Air Temperature - When RTAM DIP Switch #3 is "Off" and Switch #4 is "On", a selectable supply air reset setpoint of 50°F to 90°F via a unit mounted potentiometer or Tracer™ is permissible.
3. Reset based on Zone Temperature - When RTAM DIP Switch #3 is "On" and Switch #4 is "Off", a selectable

supply air reset setpoint of 50°F to 90°F via RTAM potentiometer or Tracer is permissible.

4. Reset based on Outdoor Air Temperature - When DIP Switch #3 and #4 are "On", a selectable supply air reset setpoint of 0°F to 100°F via RTAM potentiometer or Tracer is permissible.

Return Air Smoke Detector

The return air smoke detector is designed to shut off the unit if smoke is sensed in the return air stream. Sampling the airflow entering the unit at the return air opening performs this function.

In order for the smoke detector to properly sense smoke in the return air stream, the air velocity entering the unit must be between 500 and 4000 feet per minute. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance tables.

There are certain models however, if operated at low airflow, will not develop an airflow velocity that falls within the required 500 to 4000 feet per minute range. For these models, the design airflow shall be greater than or equal to the minimum CFM specified in the table provided below. Failure to follow these instructions will prevent the smoke detector from performing its design function.

Economizer Start-Up

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

Minimum Position Setting for 17 Plus, 6 to 10 Ton with Multi-Speed, or Single Zone VAV

⚠WARNING

Live Electrical Components!

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1. Apply power to the unit
2. Using the Service Test Guide on unit access panel, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start indoor fan.
3. Turn the MIN POS - DCV potentiometer on the RTEM clockwise to open or counter-clockwise to close. The damper will open to this setting for low speed fan operation. When adjusting minimum position, the damper may move to the new setting in several small steps. Wait at least 15 seconds for the damper to settle at the new position. Range of damper for this setting is 0-100%.
4. Momentarily jump across the Test 1 & Test 2 terminals on LTB1, to cycle through test modes to Cool 1.
5. Turn the DCV SETPOINT - LL potentiometer on the RTEM clockwise to open or counter-clockwise to close. This will set the minimum damper position at an intermediate point of fan operation range of damper for this setting is 0-75%.
6. Momentarily jump across the Test 1 & Test 2 terminals on LTB1, to cycle through test modes to Cool 2.
7. Turn the MIN POS - DESIGN potentiometer on the RTEM clockwise to open or counter-clockwise to close. This will set the minimum damper position at maximum fan speed. Range of damper for this setting is 0-50%.
8. The economizer minimum damper position for all fan speeds is complete. The RTEM will control minimum damper position along an imaginary line between the 3 damper minimum positions based on fan speed. Note: The RTEM will limit intermediate minimum damper position to ensure proper ventilation based upon the low fan speed minimum damper position set in Step 3.
9. Replace the filter access panel. The damper will close when the blower circuit is de-energized.

⚠WARNING

Live Electrical Components!

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ReliaTel™ Control: Using the Service Test Guide in Table 11, p. 48, momentarily jump across the Test 1 & Test 2 terminals on LTB1 one time to start the Minimum Ventilation Test below.

Electromechanical Control: Using the Service Test Guide perform the proper test mode connections.

1. Set the minimum position setpoint for the economizer to the required percentage of minimum ventilation using the setpoint potentiometer located on the Economizer Control (ECA).

   The economizer will drive to its minimum position setpoint, exhaust fans (if applicable) may start at

random, and the supply fan will start when the SERVICE TEST is initiated.

⚠WARNING

Rotating Components!

Failure to follow all safety precautions below could result in rotating components cutting and slashing technician which could result in death or serious injury. During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks.

The Exhaust Fan will start anytime the economizer damper position is equal to or greater than the exhaust fan setpoint.

2. Verify that the dampers stroked to the minimum position.

ReliaTel™ Control. Momentarily jump across the Test 1 & Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

Electromechanical Control. Using the Service Test Guide perform the proper test mode connections.

3. Verify that the dampers stroked to the full open position.
4. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electromechanical test mode connections (if applicable).

Compressor Start-Up

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

1. Attach a set of service gauges onto the suction and discharge gauge ports for each circuit. Refer to the refrigerant circuit illustration in the Service Facts.

ReliaTel™ Control. Momentarily jump across the Test 1 & Test 2 terminals on LTB1 one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

Electromechanical Control. Using the Service Test Guide perform the proper test mode connections.

Scroll Compressors. a.Once each compressor has started, verify that the rotation is correct. If a scroll compressor is rotating backwards, it will not pump and a loud rattling sound can be observed.

b. If the electrical phasing is correct, before condemning a compressor, interchange any two leads (at the compressor Terminal block) to check the internal phasing. If the compressor runs backward for an extended period (15 to 30 minutes), the motor winding can overheat and cause the motor winding thermostat to open.

2. After the compressor and condenser fan have started and operated for approximately 30 minutes, observe the operating pressures. Compare the operating pressures to the operating pressure curve in the Service Facts.
3. Check system superheat. Follow the instruction listed on the superheat charging curve in the Service Facts.

   Superheat should be within ±5°F of the superheat chart value.
4. Repeat steps 1 through 4 for each refrigerant circuit.
5. To stop the SERVICE TEST, turn the main power disconnect switch to the "Off" position or proceed to the next component start-up procedure. Remove electromechanical test mode connections (if applicable).

Dehumidification Option

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

Momentarily jump across the Test 1 and Test 2 terminals of the LTB1 until the unit enters test mode 7. (See Table 11, p. 48). Once the unit is in the reheat test mode, verify that the 3 way valve has shifted to the reheat position and that the supply temperature rises 10 °F more than when in cooling mode stage 2.

Monitor the suction pressure for 15 minutes. The suction pressure should remain within 5 psi of normal cooling operation. If the unit has a 2 speed outdoor fan and if the outdoor air temperature is below 70°F, verify that the OD fan is in low speed.

1. Clamp an amp meter around one of 1st stage heater power wires at the heater contactor.

ReliaTel™ Control. Using the Service Test Guide in Table 11, p. 48, continue the SERVICE TEST start-up procedure for each compressor circuit.

Momentarily jump across the Test 1 & Test 2 terminals on LTB one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

Electromechanical Control. Using the Service Test Guide perform the proper test mode connections;

2. Verify that the heater stage is operating properly.
3. Clamp an amp meter around one of 2nd stage heater power wires at the heater contactor (if applicable).

ReliaTel™ Control. Using the Service Test Guide in Table 11, p. 48, continue the SERVICE TEST start-up procedure for each compressor circuit. Momentarily jump across the Test 1 & Test 2 terminals on LTB one additional time if continuing from previous component start-up or until the desired start-up component Test is started.

Electromechanical Control. Using the Service Test Guide (Table 11, p. 48) perform the proper test mode connections;

4. Verify that the heater stage is operating properly
5. To stop the SERVICE TEST, turn the main power disconnect switch to the “Off” position or proceed to the next component start-up procedure. Remove electromechanical test mode connections (if applicable).

Final System Setup

After completing all of the pre-start and start-up procedures outlined in the previous sections (i.e., operating the unit in each of its Modes through all available stages of cooling & heating), perform these final checks before leaving the unit:

- Program the Night Setback (NSB) panel (if applicable) for proper unoccupied operation. Refer to the programming instructions for the specific panel.
- Verify that the Remote panel “System” selection switch, “Fan” selection switch, and “Zone Temperature” settings for automatic operation are correct.
- Inspect the unit for misplaced tools, hardware, and debris.
- Verify that all exterior panels including the control panel doors and condenser grilles are secured in place.
- Close the main disconnect switch or circuit protector switch that provides the supply power to the unit’s terminal block or the unit mounted disconnect switch.

Make sure all personnel are standing clear of the unit before proceeding. The system components will start when the power is applied.

Maintenance

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.
Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

Fan Belt Adjustment - Belt Drive Units

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

⚠WARNING

Rotating Components!

Failure to follow all safety precautions below could result in rotating components cutting and slashing technician which could result in death or serious injury. During installation, testing, servicing and troubleshooting of this product it may be necessary to work with live and exposed rotating components. Have a qualified or licensed service individual who has been properly trained in handling exposed rotating components, perform these tasks.

The fan belts must be inspected periodically to assure proper unit operation.

Replacement is necessary if the belts appear frayed or worn. Units with dual belts require a matched set of belts to ensure equal belt length.

When removing or installing the new belts, do not stretch them over the sheaves. Loosen the belts using the belt tension adjustment bolts on the motor mounting base.

Once the new belts are installed, using a Browning or Gates tension gauge (or equivalent) illustrated in Figure 70, p. 66; adjust the belt tension as follows;

1. To determine the appropriate belt deflection;
   a. Measure the center-to-center shaft distance (in inches) between the fan and motor sheaves.
   b. Divide the distance measured in Step 1a by 64; the resulting value represents the amount of belt deflection that corresponds to the proper belt tension.
2. Set the large O-ring on the belt tension gauge at the deflection value determined in Step 1b.
3. Set the small O-ring at zero on the force scale of the gauge plunger.
4. Place the large end of the gauge at the center of the belt span; then depress the gauge plunger until the large O-ring is even with the top of the next belt or even with a straightedge placed across the fan and motor sheaves. Refer to Figure 70, p. 66.
5. Remove the belt tension gauge. The small O-ring now indicates a number other than zero on the plunger's force scale. This number represents the force (in pounds) required to give the needed deflection.
6. Compare the "force" scale reading (Step 5) with the appropriate "force" value listed in Table 19, p. 67. If the "force" reading is outside the range, readjust the belt tension.

Note: *Actual belt deflection "force" must not exceed the maximum "force" value shown in Figure 70, p. 66.*

7. Recheck the belt tension at least twice during the first 2 to 3 days of operation. Belt tension may decrease until the new belts are "run in".

Figure 70. Belt tension gauge

$$\text{Deflection} = \frac{\text{Belt Span}}{64} \text{ (in)}$$

$$\text{Deflection} = \frac{\text{Belt Span}}{152} \text{ (mm)}$$

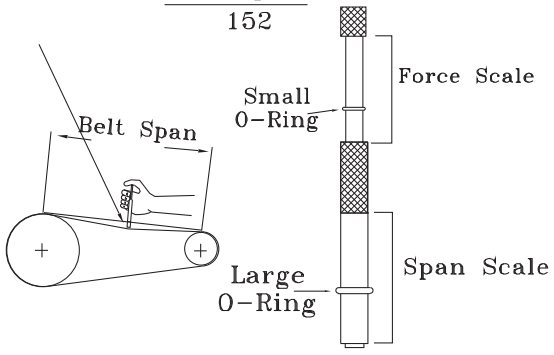


Table 19. Belt tension measurement and deflection

		Deflection Force (Lbs.)					
Belts Cross Section	Small P.D Range	Super Gripbelts		Gripnotch		Steel Cable Gripbelts	
		Min.	Max.	Min.	Max.	Min.	Max
A	3.0 - 3.6	3	4 1/2	3 7/8	5 1/2	3 1/4	4
	3.8 - 4.8	3 1/2	5	4 1/2	6 1/4	3 3/4	4 3/4
	5.0 - 7.0	4	5 1/2	5	6 7/8	4 1/4	5 1/4
B	3.4 - 4.2	4	5 1/2	5 3/4	8	4 1/2	5 1/2
	4.4 - 5.6	5 1/8	7 1/8	6 1/2	9 1/8	5 3/4	7 1/4
	5.8 - 8.8	6 3/8	8 3/4	7 3/8	10 1/8	7	8 3/4

Monthly Maintenance

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

Before completing the following checks, turn the unit OFF and lock the main power disconnect switch open.

Filters

Inspect the return air filters. Clean or replace them if necessary. Refer to the unit Service Facts for filter information.

Return Air Smoke Detector Maintenance

Airflow through the unit is affected by the amount of dirt and debris accumulated on the indoor coil and filters. To insure that airflow through the unit is adequate for proper sampling by the return air smoke detector, complete adherence to the maintenance procedures, including recommended intervals between filter changes, and coil cleaning is required.

Periodic checks and maintenance procedures must be performed on the smoke detector to insure that it will function properly. For detailed instructions concerning these checks and procedures, refer to the appropriate section(s) of the smoke detector Installation and Maintenance Instructions provided with the literature package for this unit.

Cooling Season

- Check the unit's drain pans and condensate piping to ensure that there are no blockages.
- Inspect the evaporator and condenser coils for dirt, bent fins, etc. If the coils appear dirty, clean them according to the instructions described in "Coil Cleaning" later in this section.
- Manually rotate the condenser fan(s) to ensure free movement and check motor bearings for wear. Verify that all of the fan mounting hardware is tight.
- Inspect the F/A-R/A damper hinges and pins to ensure that all moving parts are securely mounted. Keep the blades clean as necessary.
- Verify that all damper linkages move freely; lubricate with white grease, if necessary.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Check the fan shaft bearings for wear. Replace the bearings as necessary.
- Check the supply fan belt. If the belt is frayed or worn, replace it. Refer to the "Fan Belt Adjustment" section for belt replacement and adjustments.
- Verify that all wire terminal connections are tight.
- Remove any corrosion present on the exterior surfaces of the unit and repaint these areas.
- Generally inspect the unit for unusual conditions (e.g., loose access panels, leaking piping connections, etc.)
- Make sure that all retaining screws are reinstalled in the unit access panels once these checks are complete.
- With the unit running, check and record the: ambient temperature; compressor suction and discharge pressures (each circuit); superheat (each circuit);
- Record this data on an "operator's maintenance log" like the one shown in Table 20, p. 69. If the operating pressures indicate a refrigerant shortage, measure the system superheat. For guidelines, refer to the "Compressor Start-Up" section.

Important: *Do not release refrigerant to the atmosphere! If adding or removing refrigerant is required, the service technician must comply with all federal, state and local laws.*

Heating Season

- Inspect the unit's air filters. If necessary, clean or replace them.
- Check supply fan motor bearings; repair or replace the motor as necessary.
- Inspect both the main unit control panel and heat section control box for loose electrical components and terminal connections, as well as damaged wire insulation. Make any necessary repairs.
- Verify that the electric heat system operates properly.

Coil Cleaning

Regular coil maintenance, including annual cleaning, enhances the unit's operating efficiency by minimizing: compressor head pressure and amperage draw; evaporator water carryover; fan brake horsepower, due to increase static pressure losses; airflow reduction.

Maintenance

At least once each year, or more often if the unit is located in a "dirty" environment, clean the evaporator and condenser coils using the instructions outlined below. Be sure to follow these instructions as closely as possible to avoid damaging the coils.

Note: *For units equipped with hail guards follow removal procedure listed below.*

Hail Guard Removal

- Unlatch hail guard.
- Pull the top of the hail guard outward until the fastener studs are free of the retaining nuts.
- Lift the hail guard from the lower retaining bracket and set aside.

⚠WARNING

Hazardous Chemicals!

Failure to follow all safety instructions below could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

To clean refrigerant coils, use a soft brush and a sprayer (either a garden pump-up type or a high-pressure sprayer). A high-quality detergent is also required; suggested brands include "SPREX A.C.", "OAKITE 161", "OAKITE 166" and "COILOX". If the detergent selected is strongly alkaline (ph value exceeds 8.5), add an inhibitor.

Microchannel (MCHE) Coils

NOTICE

Coil Damage!

Failure to follow instructions below could result in coil damage.
DO NOT use any detergents with microchannel condenser coils. Use pressurized water or air ONLY, with pressure no greater than 600psi.

For additional information regarding the proper microchannel coil cleaning procedure, refer to service bulletin RT-SVB83-EN.*

Due to the soft material and thin walls of the MCHE coils, the traditional field maintenance method recommended for Round Tube Plate Fin (RTPF) coils does not apply to microchannel coils.

Moreover, chemical cleaners are a risk factor to MCHE due to the material of the coil. The manufacturer does not recommend the use of chemical cleaners to clean microchannel coils. Using chemical cleaners could lead to warranty claims being further evaluated for validity and failure analysis.

The recommended cleaning method for microchannel condenser coils is pressurized water or air with a non-pinpoint nozzle and an ECU of at least 180 with pressure no greater than 600 psi. To minimize the risk of coil damage, approach the cleaning of the coil with the pressure washer aimed perpendicular to the face of the coil.

Note: *For more details on Microchannel coil cleaning, please refer to bulletin RT-SVB83*-EN.*

Round Tube Plate Fin (RTPF) Coils

⚠WARNING

Hazardous Chemicals!

Failure to follow all safety instructions below could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

1. Remove enough panels from the unit to gain access to the coil.
2. Protect all electrical devices such as motors and controllers from any over spray.
3. Straighten any bent coil fins with a fin comb.
4. Mix the detergent with water according to the manufacturer's instructions. If desired, heat the solution BUT DO NOT EXCEED 150°F maximum to improve its cleansing capability.

⚠WARNING

Hazardous Pressures!

Failure to follow safety precautions below could result in coil bursting, which could result in death or serious injury. Coils contain refrigerant under pressure. When cleaning coils, maintain coil cleaning solution temperature under 150°F to avoid excessive pressure in the coil.

5. Pour the cleaning solution into the sprayer. If a high-pressure sprayer is used:
   a. do not allow sprayer pressure to exceed 600 psi.
   b. the minimum nozzle spray angle is 15 degrees.
   c. maintain a minimum clearance of 6" between the sprayer nozzle and the coil.
   d. spray the solution perpendicular (at 90 degrees) to the coil face.

6. Spray the leaving-airflow side of the coil first; then spray the opposite side of the coil. Allow the cleaning solution to stand on the coil for five minutes.
7. Rinse both sides of the coil with cool, clean water.
8. Inspect both sides of the coil; if it still appears to be dirty, repeat Steps 6 and 7.
9. Reinstall all of the components and panels removed in Step 1 and any protective covers installed in step 2.

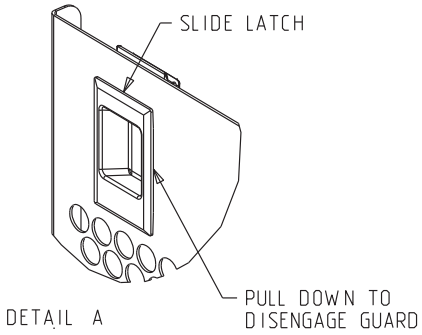
Note: *For units equipped with hail guards follow reinstallation procedure listed below.*

Hail Guard Reinstallation

To reinstall the hail guard, locate the bottom of the hail guard in the lower bracket and secure it to the upper unit bracket with the attached fasteners.

Note: *Secure hail guard latches.*

Figure 71. Hail guard



10. Restore the unit to its operational status and check system operation.

Annual Maintenance

Clean and repaint any corroded surface.

Final Process

For future reference, you may find it helpful to record the unit data requested in the blanks provided.

Complete Model Number: _____

Unit Serial Number: _____

Wiring Diagram Numbers (from unit control panel): _____

Connections: _____

Schematics: _____

Table 20. Sample maintenance log

		Refrigerant Circuit #1						Refrigerant Circuit #2					
Date	**Current Ambient Temp. F/C**	**Compr. Oil Level**	**Suct. Press. Psig/ kPa**	**Disch. Press. Psig/ kPa**	**Liquid Press. Psig/ kPa**	**Super -heat F/C**	**Sub-cool. F/C**	**Compr. Oil Level**	**Suct. Press. Psig/kPa**	**Disch. Press. Psig/ kPa**	**Liquid Press. Psig/ kPa**	**Super-heat F/C**	**Sub-cool. F/C**
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					
		- ok - low						- ok - low					

Note: *Check and record the data requested above each month during the cooling season with the unit running.*

Troubleshooting

⚠WARNING

Hazardous Service Procedures!

Failure to follow all precautions in this manual and on the tags, stickers, and labels could result in death or serious injury.
Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

ReliaTel™ Control

The RTRM has the ability to provide the service personnel with some unit diagnostics and system status information.

Before turning the main power disconnect switch "Off", follow the steps below to check the ReliaTel Refrigeration Module (RTRM). All diagnostics & system status information stored in the RTRM will be lost when the main power is turned "Off".

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

1. Verify that the Liteport LED on the RTRM is burning continuously. If the LED is lit, go to Step 3.
2. If the LED is not lit, verify that 24 VAC is presence between J1-1 and J1-2. If 24 VAC is present, proceed to Step 4. If 24 VAC is not present, check the unit main power supply, check transformer (TNS1). Proceed to Step 3 if necessary.
3. Utilizing "Method 1" or "Method 2" in the "System Status Diagnostic" section, check the following:
   - System status
   - Heating status
   - Cooling status

   If a System failure is indicated, proceed to Step 4. If no failures are indicated, proceed to Step 5.
4. If a System failure is indicated, recheck Step 1 and Step 2. If the LED is not lit in Step 1, and 24 VAC is present in Step 2, the RTRM has failed. Replace the RTRM.
5. If no failures are indicated, use one of the TEST mode procedures described in the "Unit Start-Up" section to start the unit. This procedure will allow you to check all of the RTRM outputs, and all of the external controls (relays, contactors, etc.) that the RTRM outputs energize, for each respective mode. Proceed to Step 6.
6. Step the system through all of the available modes, and verify operation of all outputs, controls, and modes. If a problem in operation is noted in any mode, you may leave the system in that mode for up to one hour while troubleshooting. Refer to the sequence of operations for each mode, to assist in verifying proper operation. Make the necessary repairs and proceed to Step 7 and Step 8.
7. If no abnormal operating conditions appear in the test mode, exit the test mode by turning the power "Off" at the main power disconnect switch.
8. Refer to the individual component test procedures if other microelectronic components are suspect.

System Status Checkout Procedure

"System Status" is checked by using one of the following two methods:

Method 1

If the Zone Sensor Module (ZSM) is equipped with a remote panel with LED status indication, you can check the unit within the space. If the ZSM does not have LED's, use Method 2. BAYSENS110*, BAYSENS109*, BAYSENS119*, BAYSENS023A all have the remote panel indication feature. The LED descriptions are listed below.

Zone Sensor LED 1 (System)

"On" during normal operation.

"Off" if a system failure occurs or the LED fails.

"Flashing" indicates test mode.

Zone Sensor LED 2 (Heat)

"On" when the heat cycle is operating.

"Off" when the heat cycle terminates or the LED fails.

"Flashing" indicates a heating failure.

Zone Sensor LED 3 (Cool)

"On" when the cooling cycle is operating.

"Off" when the cooling cycle terminates or the LED fails.

"Flashing" indicates a cooling failure.

Zone Sensor LED 4 (Service)

"On" indicates a clogged filter.

"Off" during normal operation.

"Flashing" indicates an evaporator fan or condensate overflow failure.

Below is the complete listing of failure indication causes.

System failure

Check the voltage between terminals 6 and 9 on J6, it should read approximately 32 VDC. If no voltage is present, a System failure has occurred. Refer to Step 4 in the previous section for the recommended troubleshooting procedure.

Cooling Failure

- Cooling and heating set point (slide pot) on the zone sensor has failed. Refer to the "Zone Sensor Test Procedure" section.
- Zone temperature thermistor ZTEMP on ZTS failed. Refer to the "Zone Sensor Test Procedure" section.
- CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2).
- LPC1 has opened during the 3 minute minimum "on time" during 4 consecutive compressor starts, check LPC1 or LPC2 by testing voltage between the J1-1 & J3-2 terminals on the RTRM and ground. If 24 VAC is present, the LPC's has not tripped. If no voltage is present, LPC's has tripped.

Service Failure

- If the supply fan proving switch has closed, the unit will not operate (when connected to RTOM), check the fan motor, belts, and proving switch.
- Clogged filter switch has closed, check the filters.
- If the condensate overflow switch is closed, the unit will not operate. Make sure the float switch is not in a tripped condition, and check for an "open" between wires connecting to RTOM J6-1, J6-2 (ReliaTel™ controls).

Simultaneous Heat and Cool Failure

- Emergency Stop is activated

Method 2

The second method for determining system status is done by checking voltage readings at the RTRM (J6). The system indication descriptions and the approximate voltages are listed below.

System Failure

- Measure the voltage between terminals J6-9 & J6-6.
- Normal Operation = approximately 32 VDC
- System Failure = less than 1 VDC, approximately 0.75 VDC
- Test Mode = voltage alternates between 32 VDC & 0.75 VDC

Heat Failure

- Measure the voltage between terminals J6-7 & J6-6.
- Heat Operating = approximately 32 VDC
- Heat Off = less than 1 VDC, approximately 0.75 VDC
- Heating Failure = voltage alternates between 32 VDC & 0.75 VDC

Cool Failure

- Measure the voltage between terminals J6-8 & J6-6.
- Cool Operating = approximately 32 VDC
- Cool Off = less than 1 VDC, approximately 0.75 VDC
- Cooling Failure = voltage alternates between 32 VDC & 0.75 VDC

Service Failure

- Measure the voltage between terminals J6-10 & J6-6.
- Clogged Filter = Approximately 32 VDC.
- Normal = Less than 1 VDC, approximately 0.75 VDC Fan Failure = voltage alternates between 32 VDC & 0.75 VDC.

To use LED's for quick status information at the unit, purchase a BAYSENS110* ZSM and connect wires with alligator clamps to terminals 6 through 10. Connected each respective terminal wire (6 through 10) from the Zone Sensor to the unit J6 terminals 6 through 10.

Note: *If the system is equipped with a programmable zone sensor, (BAYSENS119*, or BAYSENS023A), the LED indicators will not function while the BAYSENS110* is connected.*

Resetting Cooling and Ignition Lockouts

Cooling Failures and Heating Lockouts are reset in an identical manner. Method 1 explains resetting the system from the space; Method 2 explains resetting the system at the unit.

Note: *Before resetting Cooling Failures and Ignition Lockouts check the Failure Status Diagnostics by the methods previously explained. Diagnostics will be lost when the power to the unit is disconnected.*

Method 1

To reset the system from the space, turn the "Mode" selection switch at the zone sensor to the "Off" position. After approximately 30 seconds, turn the "Mode"

selection switch to the desired mode, i.e. Heat, Cool or Auto.

Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch “Off” and then “On”.

Lockouts can be cleared through the building management system. Refer to the building management system instructions for more information.

Zone Temperature Sensor (ZTS) Service Indicator

The ZSM SERVICE LED is a generic indicator, that will signal the closing of a Normally Open switch at any time, providing the Indoor Motor (IDM) is operating. This indicator is usually used to indicate a clogged filter, or an air side fan failure.

The RTRM will ignore the closing of this Normally Open switch for 2 (±1) minutes. This helps prevent nuisance SERVICE LED indications. The exception is the LED will flash 40 seconds after the fan is turned “On” if the Fan Proving Switch is not made.

Clogged Filter Switch

This LED will remain lit the entire time that the Normally Open switch is closed. The LED will be turned off immediately after resetting the switch (to the Normally Open position), or any time that the IDM is turned “Off”.

If the switch remains closed, and the IDM is turned “On”, the SERVICE LED will be turned “On” again after the 2 (±1) minute ignore delay.

This LED being turned “On”, will have no other affect on unit operation. It is an indicator only.

Fan Failure Switch

When the “Fan Failure” switch is wired to the RTOM, the LED will remain flashing the entire time the fan proving switch is closed, indicating a fan failure, and it will shut the unit operations down.

Condensate Overflow Switch

When the “Condensate Overflow Switch” is closed, a drain pan overflow condition is indicated and it will shut unit operations down.

Zone Temperature Sensor (ZTS) Test

Note: *These procedures are not for programmable or digital models and are conducted with the Zone Sensor Module electrically removed from the system.*

Test 1 - Zone Temperature Thermistor (ZTEMP)

This component is tested by measuring the resistance between terminals 1 and 2 on the Zone Temperature Sensor. Below are some typical indoor temperatures, and corresponding resistive values.

Test 2 - Cooling Set Point (CSP) and Heating Set Point (HSP)

Table 21. Cooling setpoint and heating setpoint

Zone Temperature		Nominal ZTEMP Resistance
50° F	10.0°C	19.9 K-Ohms
55° F	12.8°C	17.47 K-Ohms
60° F	15.6°C	15.3 K-Ohms
65° F	18.3°C	13.49 K-Ohms
70° F	21.1°C	11.9 K-Ohms
75° F	23.9°C	10.50 K-Ohms
80° F	26.7°C	9.3 K-Ohms
85° F	29.4°C	8.25 K-Ohms
90° F	32.2°C	7.3 K-Ohms

The resistance of these potentiometers are measured between the following ZSM terminals. Refer to the chart above for approximate resistances at the given setpoints.

Cool SP = Terminals 2 and 3

Range = 100 to 900 Ohms approximate

Heat SP = Terminals 2 and 5

Range = 100 to 900 Ohms approximate

Test 3 - System Mode and Fan Selection

The combined resistance of the Mode selection switch and the Fan selection switch can be measured between terminals 2 and 4 on the Zone Sensor. The possible switch combinations are listed below with their corresponding resistance values.

Test 4 - LED Indicator Test, (SYS ON, HEAT, COOL & SERVICE)

Method 1

Testing the LED using a meter with diode test function. Test both forward and reverse bias. Forward bias should measure a voltage drop of 1.5 to 2.5 volts, depending on your meter. Reverse bias will show an Over Load, or open circuit indication if LED is functional.

Method 2

Testing the LED with an analog Ohmmeter. Connect Ohmmeter across LED in one direction, then reverse the leads for the opposite direction. The LED should have at least 100 times more resistance in reverse direction, as compared with the forward direction. If high resistance in

both directions, LED is open. If low in both directions, LED is shorted.

Method 3

To test LED's with ZSM connected to unit, test voltages at LED terminals on ZSM. A measurement of 32 VDC, across an unlit LED, means the LED has failed.

Relative Humidity Sensor Test

This component is measured by measuring the mA output signal on the Relative Humidity Sensor. Verify accuracy of the sensor annually. If the output reading is 0 mA, first verify that power is applied to the sensor. A reading of 4 mA corresponds to 0% RH and 20 mA corresponds to 100% RH.

% RH	mA
30	8.8
40	10.4
50	12.0
60	13.6
70	15.2
80	16.8

Note: *Measurements should be made from LED common (ZSM terminal 6 to respective LED terminal). Refer to the Zone Sensor Module (ZSM) Terminal Identification table at the beginning of this section.*

Programmable & Digital Zone Sensor Test

Testing serial communication voltage

1. Verify 24 VAC is present between terminals J6-14 & J6-11.
2. Disconnect wires from J6-11 and J6-12. Measure the voltage between J6-11 and J6-12, should be about 32 VDC.
3. Reconnect wires to terminals J6-11 and J6-12. Measure voltage again between J6-11 and J6-12, voltage should flash high and low every 0.5 seconds. The voltage on the low end will measure about 19 VDC, while the voltage on the high end will measure from approximately 24 to 38 VDC.
4. Verify all modes of operation, by running the unit through all of the steps in Table 11, p. 48.
5. After verifying proper unit operation, exit the test mode. Turn the fan on continuously at the ZSM, by pressing the button with the fan symbol. If the fan comes on and runs continuously, the ZSM is good. If you are not able to turn the fan on, the ZSM is defective.

ReliaTel™ Refrigeration Module (RTRM) Default Chart

If the RTCI loses input from the building management system, the RTRM will control in the default mode after approximately 15 minutes. If the RTRM loses the Heating and Cooling setpoint input, the RTRM will control in the default mode instantaneously. The temperature sensing thermistor in the Zone Sensor Module is the only component required for the "Default Mode" to operate.

Unit Operation without a Zone Sensor

This procedure is for temporary operation only. The economizer and condenser fan cycling functions are disabled.

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

1. Open and Lock the unit disconnect switch.
2. Remove the Outside Air Sensor (OAS) from the condenser section of unit.
3. Use two (2) wire nuts, to individually cap the wires.
4. Locate the RTRM (J6). Connect two (2) wires to terminals J6-1 and 2.
5. Connect the sensor (OAS) using two wire nuts to the two (2) field supplied wires that were connected to terminals 1 and 2 on J6.

Unit Economizer Control (ECA) Troubleshooting

ReliaTel™ Control

Verify Economizer Status by Economizer Actuator (ECA) LED indicator:

- OFF: No Power or Failure
- ON: Normal, OK to Economize
- Slow Flash: Normal, Not OK to Economize
- Fast Flash - 1/2 Second On / 2 Seconds Off:
  - Error Code: Communications Failure
- Pulse Flash: 2 Seconds On / 1/2 Second Off:
  - Error Code:
    - 1 Flash: Actuator Fault
    - 2 Flashes: CO_2 Sensor
    - 3 Flashes: RA Humidity Sensor
    - 4 Flashes: RA Temp Sensor

Troubleshooting

- 5 Flashes: OA Quality Sensor
- 6 Flashes: OA Humidity Sensor
- 7 Flashes: OA Temp Sensor
- 8 Flashes: MA Temp Sensor
- 9 Flashes: RAM Fault
- 10 Flashes: ROM Fault
- 11 Flashes: EEPROM Fault

Electromechanical Control

⚠WARNING

Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

To prevent injury or death from electrocution, it is the responsibility of the technician to recognize this hazard and use extreme care when performing service procedures with the electrical power energized.

Cooling Failure

1. Cooling and heating set point (slide pot) on the thermostat has failed.
2. CC1 or CC2 24 VAC control circuit has opened, check CC1 & CC2 coils, and any of the controls below that apply to the unit (HPC1, HPC2, LPC1, LPC2, Frostat™).

Resetting Cooling and Heating Lockouts

Cooling Failures and Heating Lockouts are reset in an identical manner. Method 1 explains resetting the system from the space; Method 2 explains resetting the system at the unit.

Method 1

To reset the system from the space, turn the “Mode” selection switch at the thermostat to the “Off” position. After approximately 30 seconds, turn the “Mode” selection switch to the desired mode, i.e. Heat, Cool or Auto.

Method 2

To reset the system at the unit, cycle the unit power by turning the disconnect switch “Off” and then “On”.

Table 22. Fault detection and diagnostic codes

	Primary Fault Codes								Information Code		
Failures	**Mixed Air Temp Sensor Fail**	**Outdoor Temp Sensor Fail**	**Economizer Actuator Fault**	**RTEM Comm Fail**	**Pressure Dead band Fail (If Used)**	**Temp Sensor Fail (If Used)**	**Airflow Sensor Fail (If Used)**	**Space Press Dead bandFail (If Used)**	**Unit Fails to Economize**	**Unit Economizing When It Should Not**	**Damper Position % Indicated**
Damper stuck at Minimum			X		X(a)		X(a)*	X(a)	X		X
Damper Stuck Open			X		X(a)		X(a)	X(a)		X	X
Mixed Sensor Failure	X										X
Supply Air Sensor Failure						X					X
Outdoor Air Temperature Fail		X									X
Power loss to RTEM				X							
Failed or Power Loss to Actuator			X								X
Mechanical Failure of Actuator							X				

(a) If goes out of range.

Table 23. Low leak economizer sensor values

Sensor Values Data					
Temp °F	Resistance (K ohms)	Temp °F	Resistance (K ohms)	Temp °F	Resistance (K ohms)
40	26.097	54	17.847	68	12.435
41	25.383	55	17.382	69	12.126
42	24.690	56	16.930	70	11.827
43	24.018	57	16.491	71	11.535
44	23.367	58	16.066	72	11.252
45	22.736	59	15.654	73	10.977
46	22.132	60	15.253	74	10.709
47	21.530	61	14.864	75	10.448
48	20.953	62	14.486	76	10.194
49	20.396	63	14.119	77	9.949
50	19.854	64	13.762	78	9.710
51	19.330	65	13.416	79	9.477
52	18.821	66	13.078	80	9.250
53	18.327	67	12.752	81	9.030

Unit Economizer Control (ECA) Test Procedures

Electromechanical Control

This series of tests will allow you to diagnose, and determine where, and if a problem exists in the system economizer operation. Test 1 determines if the problem is in the Unit, or if it is in the ECA. Test 2 tests sensor inputs. Test 3 tests the resistors and sensors. Conduct the tests in numerical order until problem is found.

Test 1

Verifying that the economizer actuator (ECA) is functional:

1. Using the "Test Mode" described in the "System Start-Up" section, put the unit into the economizer mode and verify that the economizer actuator (ECA) drives fully open (approximately 90 seconds).
2. If the ECA is not driving the dampers, verify that 24 VAC is between the ECA terminals TR and TR1 is present. If 24 volts is not present, a wiring or terminal problem exists from the control transformer. Make any necessary repairs, see wiring diagrams to troubleshoot.
3. If 24 VAC is present, adjust the minimum position potentiometer fully clockwise. If the actuator does not drive, the economizer actuator is bad. Replace the ECA.

Test 2

Testing the ECA resistors and sensors

1. Testing the Mixed Air Sensor (MAS). Disconnect the wires connected to T and T1 on the ECA, and;
   a. Measure the resistance of the sensor between the wires 180B and 181B.
   b. Measure the temperature at the MAS location. Using the Temperature versus Resistance chart, verify the accuracy of the MAS.

   Replace the sensor if it is out of range.
2. Testing the Outdoor Air Switch. If the temperature is above 60 degrees, it will need to be chilled. Measure the resistance of the sensor on the ECA SO and +.

   The resistance should be approximately 390 Ohms.

   Replace the Switch if it is open.

   Replace the ECA if it is out of range.
3. Testing the R1 Resistance.

   Measure the resistance of the sensor on the ECA SR and +.

   The resistance should be approximately 420 Ohms.

   Replace the ECA if it is out of range.
4. Testing the R2 Resistance.

   Measure the resistance of the sensor on the ECA P and P1.

   The resistance should be approximately 130 Ohms.

   Replace the ECA if it is out of range.

Troubleshooting procedures for Direct Drive Plenum Fan

Prior to troubleshooting, verify all wiring and wiring connections. The motor has internal protections that will shut down the motor before damage occurs. A power cycle is required to reset some of the internal protections. Before proceeding, power down unit for 1 minute and then power on.

Please follow steps sequentially unless directed differently in solution.

Refer to RT-SVP08*-EN for a Comprehensive Troubleshooting Guide.

Unit Wiring Diagrams Numbers

Note: *Wiring diagrams can be accessed using e-Library by entering the diagram number in the literature order number search field or by contacting technical support.*

Table 24. Unit wiring diagram numbers

Schematic Type			Drawing Number	Description
Control	**ReliaTel™**	**230,460,575V**	1213-1640	TSC(036-060)G ReliaTel™ controls
Control	**ReliaTel™**	**230,460,575V**	4366-7216	THC(037-067)
Control	**ReliaTel™**	**230,460,575V**	4366-4568	T(S,H)C(036-060)E/F(1,3,4), ReliaTel Controls, X13 IDM
Control	**ReliaTel™**	**230,460,575V**	4366-1026	T(S,H)C(036-090)E/F(3,4,W), ReliaTel Controls, Belt-Drive IDM
Control	**ReliaTel™**	**230,460,575V**	1213-2388	TSC(072-090)H ReliaTel Cooling
Control	**ReliaTel™**	**230,460,575V**	1213-2390	TSC(092-120)H ReliaTel Cooling
Control	**ReliaTel™**	**230,460,575V**	4366-1044	TSC(092,102)F(3,4,W), ReliaTel Controls
Control	**ReliaTel™**	**230,460,575V**	4366-7433	THC(074-102)F(3,4),TSC120F(3,4,W), ReliaTel Controls
Control	**ReliaTel™**	**230,460,575V**	1213-2406	THC120F(3,4), ReliaTel Controls
Control	**Electromechanical**	**230,460,575V**	1213-1643	TSC(036-060)G Electromechanical Controls
Control	**Electromechanical**	**230,460,575V**	4366-8350	T(S,H)C(036-060)E,F(1,3,4), Electromechanical Controls, X13 IDM
Control	**Electromechanical**	**230,460,575V**	4366-8348	T(S,H)C(036-060)E,F(3,4,W), Electromechanical Controls, Belt-Drive IDM
Control	**Electromechanical**	**230,460,575V**	4366-8347	T(S,H)C(072,090)F(3,4,W), Electromechanical Controls
Control	**Electromechanical**	**230,460,575V**	1213-2413	TSC(072-120)H Electromechanical Cooling
Control	**Electromechanical**	**230,460,575V**	4366-8349	TSC(092,102)F(3,4,W), Electromechanical Controls
Control	**Electromechanical**	**230,460,575V**	4366-8352	THC(074-102)F(3,4),TSC120F(3,4,W), Electromechanical Controls
Control	**Electromechanical**	**230,460,575V**	1213-2405	THC120F(3,4), Electromechanical Controls
Power	**ReliaTel**	**230V**	1213-1636	TSC(036-060)G3, ReliaTel Controls
Power	**ReliaTel**	**230V**	4366-7177	THC(037-067) (230V)
Power	**ReliaTel**	**230V**	4366-4574	T(S,H)C(036-060)E,F (1-Phase)
Power	**ReliaTel**	**230V**	4366-5161	THC(036-060)E,F (3-Phase), X13 IDM
Power	**ReliaTel**	**230V**	4366-1037	TSC(092,102)F
Power	**ReliaTel**	**230V**	1213-2278	(THC074-102, TSC120)F (230V), ReliaTel Controls
Power	**ReliaTel**	**230V**	1213-2406	THC120F, ReliaTel Controls
Power	**ReliaTel**	**460V and/or 575V**	1213-1636	TSC(036-060)G4, ReliaTel Controls
Power	**ReliaTel**	**460V and/or 575V**	1213-1661	TSC(036-060)GW
Power	**ReliaTel**	**460V and/or 575V**	4366-7178	THC(037-067) (460V)
Power	**ReliaTel**	**460V and/or 575V**	4366-5161	THC(036-060)E,F (3-Phase), X13 IDM
Power	**ReliaTel**	**460V and/or 575V**	4366-1037	TSC(092,102)F
Power	**ReliaTel**	**460V and/or 575V**	1213-2278	(THC074-102, TSC120)F (460V), ReliaTel Controls
Power	**ReliaTel**	**460V and/or 575V**	1213-2279	TSC120F (575V), ReliaTel Controls
Power	**ReliaTel**	**460V and/or 575V**	4366-1020	T(YS,H)C(036-090)E3,4,W, ReliaTel™ Controls

Unit Wiring Diagrams Numbers

Table 24. Unit wiring diagram numbers (continued)

Schematic Type			Drawing Number	Description
Power	**ReliaTel**	**460V and/or 575V**	1213-2406	THC120F, ReliaTel Controls
Power	**Electromechanical**	**230V**	1213-1636	TSC(036-060)G3, Electromechanical Controls
Power	**Electromechanical**	**230V**	1213-2405	THC120F, Electromechanical Controls
Power	**Electromechanical**	**230V**	1213-2273	THC(074-102)F, TSC120, Electromechanical Controls
Power	**Electromechanical**	**460V and/or 575V**	1213-1636	TSC(036-060)G4, Electromechanical Controls
Power	**Electromechanical**	**460V and/or 575V**	1213-1661	TSC(036-060)GW
Power	**Electromechanical**	**460V and/or 575V**	1213-2405	THC120F, Electromechanical Controls
Power	**Electromechanical**	**460V and/or 575V**	1213-2273	THC(074-102)F4,TSC(120)F4, Electromechanical Controls
Power	**Electromechanical**	**460V and/or 575V**	1213-2274	TSC120FW, Electromechanical Controls
Power	**Electromechanical**	**460V and/or 575V**	4366-1020	T(YS,H)C(036-090)E3,4,W, Electromechanical Controls
Power	**Electromechanical/ ReliaTel™**	**230,460,575V**	1213-2384	TSC(072-120)H Constant Volume IDM
Power	**Electromechanical/ ReliaTel™**	**230,460,575V**	1213-2385	TSC(072-120)H Multispeed IDM, SZVAV, MZVAV
Connection	**ReliaTel™**	**230V**	1213-1668	TSC(036-060)G3, 230V ReliaTel Controls
Connection	**ReliaTel™**	**230V**	4366-7336	THC(037) (230V)
Connection	**ReliaTel™**	**230V**	4366-8243	THC037E, 17 Plus with Multi-Zone VAV
Connection	**ReliaTel™**	**230V**	4366-7338	THC(047-067) (230V)
Connection	**ReliaTel™**	**230V**	4366-8245	THC (047,067)E, 17 Plus with Multi-Zone VAV
Connection	**ReliaTel™**	**230V**	4366-8251	THC(074-120)E, ReliaTel Controls with Multi-Zone VAV
Connection	**ReliaTel™**	**230V**	4366-4559	T(S,H)C(036-060)E,F (1-Phase), ReliaTel Controls
Connection	**ReliaTel™**	**230V**	4366-5182	THC(036-060)E,F (3-Phase), ReliaTel Controls, X13 IDM
Connection	**ReliaTel™**	**230V**	4366-1509	T(S,H)C(036-060)E,F (3-Phase), ReliaTel Controls, Belt-Drive IDM
Connection	**ReliaTel™**	**230V**	4366-1541	T(S,H)C(072,090)F, ReliaTel Controls
Connection	**ReliaTel™**	**230V**	4366-7441	THC120F, ReliaTel Controls
Connection	**ReliaTel™**	**230V**	4366-1534	TSC(092,102)F, ReliaTel Controls
Connection	**ReliaTel™**	**230V**	4366-7443	THC(074-102)F, TSC120F, ReliaTel Controls
Connection	**ReliaTel™**	**230V**	4366-8252	THC(074-102)F, TSC120F, ReliaTel Controls with Multi-Zone VAV
Connection	**ReliaTel™**	**460V and/or 575V**	1213-1668	TSC(036-060)G4, 460V ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	1213-1670	TSC(036-060)GW, ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	4366-8252	THC(074-102)F, TSC120F, ReliaTel Controls with Multi-Zone VAV
Connection	**ReliaTel™**	**460V and/or 575V**	4366-7337	THC(037) (460V)
Connection	**ReliaTel™**	**460V and/or 575V**	4366-8244	THC037E, 17 Plus with Multi-Zone VAV
Connection	**ReliaTel™**	**460V and/or 575V**	4366-7339	THC(047-067) (460V)
Connection	**ReliaTel™**	**460V and/or 575V**	4366-8246	THC(047,067)E, 17 Plus with Multi-Zone VAV

Table 24. Unit wiring diagram numbers (continued)

Schematic Type			Drawing Number	Description
Connection	**ReliaTel™**	**460V and/or 575V**	4366-5182	THC(036-060)E,F (3-Phase), ReliaTel Controls, X13 IDM
Connection	**ReliaTel™**	**460V and/or 575V**	4366-1509	T(S,H)C(036-060)E,F (3-Phase), ReliaTel Controls, Belt-Drive IDM
Connection	**ReliaTel™**	**460V and/or 575V**	4366-1541	T(S,H)C(072,090)F, ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	4366-7441	THC120F, ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	4366-8251	THC(074-120)E, ReliaTel Controls with Multi-Zone VAV
Connection	**ReliaTel™**	**460V and/or 575V**	4366-1534	TSC(092,102)F, ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	4366-7443	(THC074-102, TSC120)F, (460V), ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	4366-7445	TSC120F (575V), ReliaTel Controls
Connection	**ReliaTel™**	**460V and/or 575V**	4366-8253	TSC120F (575V), ReliaTel Controls with Multi-Zone VAV
Connection	**ReliaTel™**	**230,460,575V**	1213-2662	TSC(072-090)H ReliaTel
Connection	**ReliaTel™**	**230,460,575V**	1213-2663	TSC(092-120)H ReliaTel
Connection	**Electromechanical**	**230V**	1213-1669	TSC(036-060)G3, Electromechanical Controls
Connection	**Electromechanical**	**230V**	4366-8366	T(S,H)C(036-060)E,F (1-Phase), Electromechanical Controls
Connection	**Electromechanical**	**230V**	4366-8367	THC(036-060)E,F (3-Phase), Electromechanical Controls, X13 IDM
Connection	**Electromechanical**	**230V**	4366-8363	T(S,H)C(036-060)E,F (3-Phase), Electromechanical Controls, Belt-Drive IDM
Connection	**Electromechanical**	**230V**	4366-8365	T(S,H)C(072,090)F, Electromechanical Controls
Connection	**Electromechanical**	**230V**	4366-8368	THC120F, Electromechanical Controls
Connection	**Electromechanical**	**230V**	4366-8364	TSC(092,102)F, Electromechanical Controls
Connection	**Electromechanical**	**230V**	4366-8369	(THC074-102, TSC120)F, (230V), Electromechanical Controls
Connection	**Electromechanical**	**230,460,575V**	1213-2660	TSC(072-102)H Electromechanical
Connection	**Electromechanical**	**230,460,575V**	1213-2661	TSC(092-120)H Electromechanical
Connection	**Electromechanical**	**460V and/or 575V**	1213-1669	TSC(036-060)G4, Electromechanical Controls
Connection	**Electromechanical**	**460V and/or 575V**	1213-1671	TSC(036-060)GW, Electromechanical Controls
Connection	**Electromechanical**	**460V and/or 575V**	4366-8367	THC(036-060)E,F (3-Phase), Electromechanical Controls, X13 IDM
Connection	**Electromechanical**	**460V and/or 575V**	4366-8363	T(S,H)C(036-060)E,F (3-Phase), Electromechanical Controls, Belt-Drive IDM
Connection	**Electromechanical**	**460V and/or 575V**	4366-8365	T(S,H)C(072,090)F, Electromechanical Controls
Connection	**Electromechanical**	**460V and/or 575V**	4366-8368	THC120F, Electromechanical Controls
Connection	**Electromechanical**	**460V and/or 575V**	4366-8364	TSC(092,102)F, Electromechanical Controls
Connection	**Electromechanical**	**460V and/or 575V**	4366-8369	(THC074-102, TSC120)F (460V), Electromechanical Controls
Connection	**Electromechanical**	**460V and/or 575V**	4366-8370	TSC120F (575V), Electromechanical Controls

Limited Warranty

Electric Air Conditioner

TCD, TCH, TSC and THC (Parts Only)

Models Less Than 20 Tons for Commercial Use*

This warranty is extended by Trane to the original purchaser and to any succeeding owner of the real property to which the Electric/ Electric Air Conditioner is originally affixed, and applies to products purchased and retained for use within the U.S.A. and Canada. There is no warranty against corrosion, erosion or deterioration.

If any part of your Electric/ Electric Air Conditioner fails because of a manufacturing defect within one year from the date of the original purchase, Warrantor will furnish without charge the required replacement part.

In addition, if the sealed motor-compressor fails because of a manufacturing defect within the second through fifth year from the date of original purchase, Warrantor will furnish without charge the required replacement compressor.

Warrantor's obligations and liabilities under this warranty are limited to furnishing F.O.B. Warrantor factory or warehouse at Warrantor designated shipping point, freight allowed to Buyer's city, replacement parts for Warrantor's products covered under this warranty. Warrantor shall not be obligated to pay for the cost of lost refrigerant. No liability shall attach to Warrantor until products have been paid for and then liability shall be limited solely to the purchase price of the equipment under warranty shown to be defective.

THE WARRANTY AND LIABILITY SET FORTH HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, WHETHER IN CONTRACT OR IN NEGLIGENCE, EXPRESS OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE, AND IN NO EVENT SHALL WARRANTOR BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Trane

2701 Wilma Rudolph Blvd.

Clarksville, TN 37040-1008

Attention: Manager, Product Service

GW-606-4800

* This warranty is for commercial usage of said equipment and not applicable when the equipment is used for a residential application. Commercial use is any application where the end purchaser uses the product for other than personal, family or household purposes.

**A 5 year limited warranty is provided for the optional "Low Leak" economizer when combined with the additional FDD (Fault Detection & Diagnostics) option.

Trane and American Standard create comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or americanstandardair.com.

RT-SVX22V-EN 02 Apr 2020
Supersedes RT-SVX22U-EN (Mar 2018)

TRANE®

Installation/ Operator Maintenance

VariTrane™ Single-Duct and Fan-Powered Units

All VariTrane VAV Models with pneumatic, electronic, DDC controls and diffusers.

June 2006

VAV-SVN01E-EN

Contents

TRANE®

Service Model Number Description

⚠ WARNING

Fiberglass Wool!

WARNING: ALL INSULATED UNITS (except closed-cell foam insulation) CONTAIN FIBERGLASS WOOL! Read this literature prior to installation for proper instruction. Disturbing the insulation in this product during installation, maintenance or repair will expose you to airborne particles of glass wool fibers and ceramic fibers known to the state of California to cause cancer through inhalation. Glass wool fibers may also cause respiratory, skin or eye irritation.

Single-Duct Units

Digit 1, 2—Unit Type

VC	VariTrane single-duct

Digit 3—Reheat

C	Cooling Only
E	Electric Heat
W	Hot Water Heat

Digit 4—Development Sequence

F	Sixth

Digit 5, 6—Primary Air Valve

04	4" inlet (225 cfm)
05	5" inlet (350 cfm)
06	6" inlet (500 cfm)
08	8" inlet (900 cfm)
10	10" inlet (1400 cfm)
12	12" inlet (2000 cfm)
14	14" inlet (3000 cfm)
16	16" inlet (4000 cfm)
24	24" x 16" inlet (8000 cfm)

Digit 7, 8—Not Used

00	N/A

Digit 9—Not Used

0	N/A

Digit 10, 11—Design Sequence

H0	Fourth (factory assigned)

Digit 12, 13, 14, 15—Controls

ENON	No controls, field-installed DDC/electric
PNON	No controls, field-installed pneumatic
DD00	Trane elec actuator only
DD01	DDC – Cooling only
DD02	DDC – N.C. on/off water valve control
DD03	DDC – Prop hot water valve control
DD04	DDC – On/off electric heat
DD05	DDC – Pulse-width modulation electric heat
DD07	DDC – N.O. on/off water valve control
DD11	LonTalk DDC Controller—Cooling only
DD12	LonTalk DDC Controller w/ N.C. on/off hot water control
DD13	LonTalk DDC Controller w/ proportional hot water control
DD14	LonTalk DDC Controller–on/off electric heat control
DD15	LonTalk DDC Controller w/ pulse-width modulation electric heat control
DD17	LonTalk DDC Controller w/ N.O. on/off hot water control
FM00	FM – Customer-supplied actuator & controller
FM01	FM –Trane actuator w/ cusomer-supplied control
VMA1	FM – Johnson controls VMA-1410
VMA2	FM – Johnson controls VMA-1420
PWR1	FM – Seimens 540-100 w/ GDE131.1P actuator
PWR4	FM – Seimens 540-100 w/Trane actuator
PWR5	FM – Seimens 540-100 w/ GDE131.1U actuator
AT01	FM – Automated Logic U341V+
AT02	FM – Automated Logic U141V+
EI05	Analog –With optional on/off reheat
EI28	Analog –With optional on/off reheat with dual-minimum cfm
EI29	Analog –With optional on/off reheat with constant-volume cfm
PC00	PN – N.C.Trane pneumatic actuator
PC04	PN – N.C. with optional on/off HW, DA Stat
PC05	PN – N.C. with optional on/off electric, RA Stat
PN00	PN – N.O.Trane pneumatic actuator, RA Stat
PN04	PN – N.O. PVR, DA Stat
PN05	PN – N.O. PVR, RA Stat
PN11	PN – N.O. dual-minimum cfm, DA Stat
PN32	PN –Water Valve, N.O. constant volume, DA Stat
PN34	PN – Electric heat, N.O. constant volume, DA Stat

***Notes*:**

N.C. = Normally-closed
N.O. = Normally-opened
DA Stat = Direct-acting pneumatic t-stat (by others)
RA Stat = Reverse-acting pneumatic t-stat (by others)
PN = Pneumatic
FM = Factory installation of customer-supplied controller
PVR = Pneumatic Volume Regulator

Digit 16—Insulation

A	1/2" Matte-faced
B	1" Matte-faced
C	1/2" Foil-faced
D	1" Foil-faced
F	1" Double-wall
G	3/8" Closed-cell

Service Model Number Description

Single-Duct Units (con't.)

Digit 17—Not Used

0 N/A

Digit 18—Not Used

0 N/A

Digit 19—Outlet Plenum (Connection is Slip & Drive)

0 None
A 1 Outlet RH
B 1 Outlet END
C 1 Outlet LH
D 2 Outlets, 1 RH, 1 END
E 2 Outlets, 1 LH, 1 END
F 2 Outlets, 1 RH, 1 LH
H 3 Outlets, 1 LH, 1 RH, 1 END
J 4 Outlets, 1 LH, 1 RH, 2 END

***Note**: See unit drawings for outlet sizes/ damper information.*

Digit 20—Not Used

0 N/A

Digit 21—Water Coil

0 None
1 1-Row
2 2-Row

Digit 22—Electrical Connections (VCCF, VCWF can be flipped in the field to achieve opposite-hand connection)

L Left (Airflow hitting you in the face)
R Right (Airflow hitting you in the face)
0 Opposite side connection – coil and control

Digit 23—Transformer

0 None
1 120/24 volt (50 VA)
2 208/24 volt (50 VA)
3 240/24 volt (50 VA)
4 277/24 volt (50 VA)
5 480/24 volt (50 VA)
6 347/24 Volt (50 VA)
7 575/24 Volt (50 VA)
8 380/24 Volt (50 VA)

***Note**: For VCEF units with transformers the VA depends on the staging, control, and contactor type (ranges are 40 VA to 75 VA)*

Digit 24—Disconnect Switch

0 None
W With

***Note:** VCCF, VCWF – Toggle Disconnect VCEF – Door Interlocking Power Disconnect*

Digit 25—Power Fuse

0 None
W With

Digit 26—Electric Heat Voltage

0 None
A 208/60/1
B 208/60/3
C 240/60/1
D 277/60/1
E 480/60/1
F 480/60/3
G 347/60/1
H 575/60/3
J 380/50/3
K 120/60/1

Digit 27, 28, 29—Electric Heat kW

000 None
050 0.5 kW
010 1.0 kW
015 1.5 kW
↓ ↓
460 46.0 kW

***Notes**:*
0.5 to 8.0 kW – ½ kW increments
8.0 to 18.0 kW – 1 kW increments
18.0 to 46.0 kW – 2 kW increments

Digit 30—Electric Heat Stages

0 None
1 1 Stage
2 2 Stages Equal
3 3 Stages Equal

Digit 31—Contactors

0 None
1 24-volt magnetic
2 24-volt mercury
3 PE with magnetic
4 PE with mercury

Digit 32—Not Used

0 N/A

TRANE®

Service Model Number Description

Dual-Duct Units

Digit 1, 2, 3—Unit Type

VDD VariTrane dual-duct

Digit 4—Development Sequence

F Sixth

Digit 5, 6—Primary Air Valve

05 5" inlet (350 cfm)
06 6" inlet (500 cfm)
08 6" inlet (900 cfm)
10 10" inlet (1400 cfm)
12 12" inlet (2000 cfm)
14 14" inlet (3000 cfm)
16 16" inlet (4000 cfm)

Digit 7, 8—Secondary Air Valve

05 5" inlet (350 cfm)
06 6" inlet (500 cfm)
08 8" inlet (900 cfm)
10 10" inlet (1400 cfm)
12 12" inlet (2000 cfm)
14 14" inlet (3000 cfm)
16 16" inlet (4000 cfm)

Digit 9—Not Used

0 N/A

Digit 10, 11—Design Sequence

C0 Third (factory assigned)

Digit 12, 13, 14, 15—Controls

ENON No Controls, Field-installed DDC/Electric
PNON No Controls, Field-installed Pneumatic
DD00 Trane elec actuator only
DD01 DDC – Cooling only
DD08 DDC – Constant-volume discharge
DD11 LonTalk DDC Controller—Cooling only
DD18 LonTalk DDC Controller—Constant Volume Discharge
FM00 FM – Customer-supplied actuator & controller
FM01 FM –Trane actuator w/ customer-supplied controller
PC03 PN – N.C. heating/ N.O. cooling w/ PVRs, DA stat
PN08 PN – N.O. heating/ N.O. cool act. only, RA stat
PN09 PN – N.O. htg/clg vlvs w/ PVRs, DA stat
PN10 PN – N.O. htg/clg w/ PVRs (cv disch), DA stat.

Notes:

N.C. = *Normally-closed*
N.O. = *Normally-opened*
DA Stat = *Direct-acting pneumatic t-stat (by others)*
RA Stat = *Reverse-acting pneumatic t-stat (by others)*
PN = *Pneumatic*
FM = *Factory installation of customer-supplied controller*
PVR = *Pneumatic Volume Regulator*

Digit 16—Insulation

A 1/2" Matte-faced
B 1" Matte-faced
C 1/2" Foil-faced
D 1" Foil-faced
F 1" Double-wall
G 3/8" Closed-cell

Digit 17—Not Used

0 N/A

Digit 18—Not Used

0 N/A

Digit 19—Outlet Plenum (Connection is slip & drive)

0 none
A 1 outlet–RH
B 1 outlet–END
C 1 outlet–LH
D 2 outlets–1 RH, 1 END
E 2 outlets–1 LH, 1 END
F 2 outlets–1 RH, 1 LH
G 2 outlets - END
H 3 outlets–1 LH, 1 RH, 1 END
J 4 outlets–1 LH, 1 RH, 2 END

Note: See unit drawings for outlet sizes/ damper information.

Digit 20—Not Used

0 N/A

Digit 21—Not Used

0 N/A

Digit 22—Not Used

0 N/A

Digit 23—Transformer

0 None
1 120/24 volt (50 VA)
2 208/24 volt (50 VA)
3 240/24 volt (50 VA)
4 277/24 volt (50VA)
5 480/24 volt (50 VA)
6 347/24 volt (50 VA)
7 575/24 volt (50 VA)

Digit 24—Disconnect Switch

0 None
W With Toggle

Digit 25—Power Fuse

0 None
W With

Service Model Number Description

Fan-Powered Parallel Units

Digit 1, 2—Unit Type
VP VariTrane fan-powered parallel

Digit 3—Reheat
C Cooling Only
E Electric Heat
W Hot Water Heat

Digit 4—Development Sequence
F Sixth

Digit 5, 6—Primary Air Valve
05 5" inlet (350 max cfm)
06 6" inlet (500 max cfm)
08 8" inlet (900 max cfm)
10 10" inlet (1400 max cfm)
12 12" inlet (2000 max cfm)
14 14" inlet (3000 max cfm)
16 16" inlet (4000 max cfm)

Digit 7, 8—Secondary Air Valve
00 N/A

Digit 9—Fan
P 02SQ fan (500 nominal cfm)
Q 03SQ fan (1100 nominal cfm)
R 04SQ fan (1350 nominal cfm)
S 05SQ fan (1550 nominal cfm)
T 06SQ fan (1850 nominal cfm)
U 07SQ fan (2000 nominal cfm)

Digit 10, 11—Design Sequence
J0 Design Sequence (Factory assigned)

Digit 12, 13, 14, 15—Controls
ENON No controls, field-installed DDC or analog
ENCL ENON with controls enclosure
PNON No controls, field-installed pneumatic
DD00 Trane elec actuator only
DD01 DDC – cooling only
DD02 DDC – N.C. on/off water control
DD03 DDC – prop hot water control
DD04 DDC – on/off electric heat control
DD05 DDC – pulse-width modulation electric heat control
DD07 DDC – N.O. on/off hot water control
DD11 LonTalk DDC Controller—Cooling only
DD12 LonTalk DDC Controller w/ N.C. on/off hot water control
DD13 LonTalk DDC Controller w/ proportional hot water control
DD14 LonTalk DDC Control–on/off electric heat control
DD15 LonTalk DDC Controller w/ pulse-width modulation electric heat control
DD17 LonTalk DDC Controller w/ N.O. on/off hot water control
FM00 FM customer actuator & control
FM01 FM Trane actuator w/ customer-supplied controller
VMA2 FM Johnson Controls VMA-1420
PWR1 FM Seimens 540-100 w/ GDE131.1P actuator
PWR4 FM Seimens 540-100 w/Trane actuator
PWR5 FM Seimens 540-100 w/ GDE131.1U actuator
AT01 FM Automated Logic U341V+
AT02 FM Automated Logic U141V+
EI05 Analog – fan-powered parallel with optional on/off reheat
PN00 PN – N.O. Trane pneumatic actuator, R.A. stat
PN05 PN – N.O. PVR, R.A. stat

Notes:
N.C. = *Normally-closed*
N.O = *Normally-opened*
DA Stat = *Direct-acting pneumatic t-stat (by others)*
RA Stat = *Reverse-acting pneumatic t-stat (by others)*
PN = *Pneumatic*
FM = *Factory installation of customer-supplied controller*
PVR = *Pneumatic Volume Regulator*

Digit 16—Insulation
A 1/2" Matte-faced
B 1" Matte-faced
C 1/2" Foil-faced
D 1" Foil-faced
F 1" Double-wall
G 3/8" Closed-cell

Digit 17—Motor Type
D PSC Motor
E High-efficiency motor (ECM)

Digit 18—Motor Voltage
1 115/60/1
2 277/60/1
3 347/60/1
4 208/60/1
5 230/50/1

Digit 19—Outlet Connection
1 Flanged
2 Slip & Drive

Digit 20—Attenuator
0 None
W With

Digit 21—Water Coil
0 None
1 1-Row–Plenum inlet installed RH
2 2-Row–Plenum inlet installed RH
3 1-Row–Discharge installed, LH
4 1-Row–Discharge installed, RH
5 2-Row–Discharge installed, LH
6 2-Row–Discharge installed, RH

Digit 22—Electrical Connections
L Left
R Right

Electrical Connections Note: Airflow hitting you in the face.

Digit 23—Transformer
0 N/A (provided as standard)

Digit 24—Disconnect Switch
0 None
W With

Note: VPCF, VPWF – Toggle Disconnect
VPEF – Door Interlocking Power Disconnect

Digit 25—Power Fuse
0 None
W With

Digit 26—Electric Heat Voltage
0 None
A 208/60/1
B 208/60/3
C 240/60/1
D 277/60/1
E 480/60/1
F 480/60/3
G 347/60/1
H 575/60/3
J 380/50/3
K 120/60/1

Digit 27, 28, 29—Electric Heat Voltage
000 None
050 0.5 kW
010 1.0 kW
015 1.5 kW
↓ ↓
260 26.0 kW

Electric Heat Voltage Notes:
0.5 to 8.0 kW–½ kW increments
8.0 to 18.0 kW –1 kW increments
18.0 to 46.0 kW–2 kW increments

Service Model Number Description

Fan-Powered Parallel Units (con't)

Digit 30—Electric Heat Stages

0 None
1 1 Stage
2 2 Stages Equal
3 3 Stages Equal

Digit 31—Contactors

0 None
1 24-volt magnetic
2 24-volt mercury
3 PE with magnetic
4 PE with mercury

Digit 32—Airflow Switch

0 None
W With

Service Model Number Description

Fan-Powered Series Units

Digit 1, 2—Unit Type

VS VariTrane fan-powered series

Digit 3—Reheat

C Cooling Only
E Electric Heat
W Hot Water Heat

Digit 4—Development Sequence

F Sixth

Digit 5, 6—Primary Air Valve

04 4" inlet (225 max cfm)
05 5" inlet (350 max cfm)
06 6" inlet (500 max cfm)
08 8" inlet (900 max cfm)
10 10" inlet (1400 max cfm)
12 12" inlet (2000 max cfm)
14 14" inlet (3000 max cfm)
16 16" inlet (4000 max cfm)

Digit 7, 8—Secondary Air Valve

00 N/A

Digit 9—Fan

P 02SQ fan (700 nominal cfm)
Q 03SQ fan (1200 nominal cfm)
R 04SQ fan (1550 nominal cfm)
S 05SQ fan (1900 nominal cfm)
T 06SQ fan (2600 nominal cfm)
U 07SQ fan (3000 nominal cfm)

Fan Note: See fan curves for specific airflows

Digit 10, 11—Design Sequence

J0 Design Sequence (Factory assigned)

Digit 12, 13, 14, 15—Controls

ENON No controls, field-installed DDC or analog
ENCL ENON with control enclosure
PNON No controls, field-installed pneumatic
DD00 Trane elec actuator only
DD01 DDC – cooling only
DD02 DDC – N.C. on/off water control
DD03 DDC – prop hot water control
DD04 DDC – on/off electric heat control
DD05 DDC – pulse-width modulation electric heat control
DD07 DDC N.O. on/off hot water control
DD11 LonTalk DDC Controller—Cooling only
DD12 LonTalk DDC Controller w/ N.C. on/off hot water control
DD13 LonTalk DDC Controller w/ proportional hot water control
DD14 LonTalk DDC Controller–on/off electric heat control
DD15 LonTalk DDC Controller w/ pulse-width modulation electric heat control
DD17 LonTalk DDC Controller w/ N.O. on/off hot water control
FM00 FM customer actuator & control
FM01 FM Trane actuator w/ customer-supplied controller
VMA2 FM Johnson controls VMA-1420
PWR1 FM Seimens 540-100 w/ GDE131.1P actuator
PWR4 FM Seimens 540-100 w/Trane actuator
PWR5 FM Seimens 540-100 w/ GDE131.1U actuator
AT01 FM Automated Logic U341V+
AT02 FM Automated Logic U141V+
EI71 Analog fan-powered series with optional on/off reheat
PN00 PN – N.O. Trane pneumatic actuator, R.A. stat
PN51 PN – N.O. PVR, duct pressure switch, R.A. stat
PN52 PN – N.O. PVR, dual pressure main, R.A. stat

Notes:

N.C. = *Normally-closed*
N.O. = *Normally-opened*
DA Stat = *Direct-acting pneumatic t-stat (by others)*
RA Stat = *Reverse-acting pneumatic t-stat (by others)*
PN = *Pneumatic*
FM = *Factory installation of customer-supplied controller*
PVR = *Pneumatic Volume Regulator*

Digit 16—Insulation

A 1/2" Matte-faced
B 1" Matte-faced
C 1/2" Foil-faced
D 1" Foil-faced
F 1" Double-wall
G 3/8" Closed-cell

Digit 17—Motor Type

D PSC Motor
E High-efficiency motor (ECM)

Digit 18—Motor Voltage

1 115/60/1
2 277/60/1
3 347/60/1
4 208/60/1
5 230/50/1

Digit 19—Outlet Connection

1 Flanged
2 Slip & Drive

Digit 20—Attenuator

0 None
W With

Digit 21—Water Coil

0 None
3 1-Row–Discharge installed, LH
4 1-Row–Discharge installed, RH
5 2-Row–Discharge installed, LH
6 2-Row–Discharge installed, RH

Digit 22—Electrical Connections

L Left
R Right

Water Coil and Electrical Connections Note: Airflow hitting you in the face.

Digit 23—Transformer

0 N/A (provided as standard)

Digit 24—Disconnect Switch

0 None
W With

Note: VSCF, VSWF – Toggle Disconnect VSEF – Door Interlocking Power Disconnect

Digit 25—Power Fuse

0 None
W With

Digit 26—Electric Heat Voltage

0 None
A 208/60/1
B 208/60/3
C 240/60/1
D 277/60/1
E 480/60/1
F 480/60/3
G 347/60/1
H 575/60/3
J 380/50/3
K 120/60/1

Service Model Number Description

Fan-Powered Series Units (con't)

Digit 27, 28, 29—Electric Heat Kilowatts

000	None
050	0.5 kW
010	1.0 kW
015	1.5 kW
↓	↓
240	24.0 kW

Digit 30—Electric Heat Stages

0	None
1	1 Stage
2	2 Stages Equal
3	3 Stages Equal

Digit 31—Contactors

0	None
1	24-volt magnetic
2	24-volt mercury
3	PE with magnetic
4	PE with mercury

Digit 32—Airflow Switch

0	None
W	With

Service Model Number Description

Fan-Powered Low-Height Parallel Units

Digit 1, 2—Unit Type

LP VariTrane fan-powered low-height parallel

Digit 3—Reheat

C Cooling Only
E Electric Heat
W Hot Water Heat

Digit 4—Development Sequence

F Sixth

Digit 5, 6—Primary Air Valve

05 5" inlet (350 maximum cfm)
06 6" inlet (500 maximum cfm)
08 8" inlet (900 maximum cfm)
RT 8" x 14" inlet (1800 maximum cfm)

Digit 7, 8—Secondary Air Valve

00 N/A

Digit 9—Fan

V 08SQ 500 nominal cfm
W 09SQ 900 nominal cfm
X 10SQ 1800 nominal cfm

Digit 10, 11—Design Sequence

K0 Sixth (factory assigned)

Digit 12, 13, 14, 15—Controls

ENON No controls, field-installed DDC/electric
PNON No controls, field-installed pneumatic
DD00 Trane elec actuator only
DD01 DDC – cooling only
DD02 DDC – N.C. on/off water valve control
DD03 DDC – prop hot water valve control
DD04 DDC – on/off electric heat control
DD05 DDC – pulse-width modulation control
DD07 DDC – N.O. on/off water valve control
DD11 LonTalk DDC Controller—Cooling only
DD12 LonTalk DDC Controller w/ N.C. on/off hot water control
DD13 LonTalk DDC Controller w/ proportional hot water control
DD14 LonTalk DDC Controller–on/off electric heat control
DD15 LonTalk DDC Controller w/ pulse-width modulation electric heat control
DD17 LonTalk DDC Controller w/ N.O. on/off hot water control
FM00 FM customer actuator & control
FM01 FM Trane actuator w/ customer-supplied controller
VMA2 FM Johnson Controls VMA-1420
PWR1 FM Seimens 540-100 w/ GDE131.1P actuator
PWR4 FM Seimens 540-100 w/Trane actuator
PWR5 FM Seimens 540-100 w/ GDE131.1U actuator
AT01 FM Automated Logic U341V+
AT02 FM Automated Logic U141V+
EI05 Analog – fan-powered parallel with optional on/off reheat
PN00 PN – N.O. Trane pneumatic actuator, R.A. stat
PN05 PN – N.O. PVR, R.A. stat

Notes:

N.C. = *Normally-closed*
N.O. = *Normally-opened*
DA Stat = *Direct-acting pneumatic t-stat (by others)*
RA Stat = *Reverse-acting pneumatic t-stat (by others)*
PN = *Pneumatic*
FM = *Factory installation of customer-supplied controller*
PVR = *Pneumatic Volume Regulator*

Digit 16—Insulation

A 1/2" Matte-faced
B 1" Matte-faced
C 1/2" Foil-faced
D 1" Foil-faced
F 1" Double-wall
G 3/8" Closed-cell

Digit 17—Motor Type

D PSC Motor
E High-efficiency motor (ECM)

Digit 18—Motor Voltage

1 115/60/1
2 277/60/1
3 347/60/1
5 230/50/1

Digit 19—Outlet Connection

1 Flanged
2 Slip & Drive

Digit 20—Not Used

0 N/A

Digit 21—Water Coil

0 None
1 1-Row–Plenum inlet installed
2 2-Row–Plenum inlet installed
3 1-Row–Discharge installed, LH
4 1-Row–Discharge installed, RH
5 2-Row–Discharge installed, LH
6 2-Row–Discharge installed, RH

Digit 22—Electrical Connections

L Left (airflow hitting you in the face)

Digit 23—Transformer

0 N/A (provided as standard)

Digit 24—Disconnect Switch

0 None
W With

Note: ***LPCF, LPWF – Toggle Disconnect LPEF – Door Interlocking Power Disconnect***

Digit 25—Power Fuse

0 None
W With

Digit 26—Electric Heat Voltage

0 None
A 208/60/1
B 208/60/3
C 240/60/1
D 277/60/1
E 480/60/1
F 480/60/3
G 347/60/1
H 575/60/3
J 380/50/3

Service Model Number Description

Fan-Powered Low-Height Parallel Units (con't)

Digit 27, 28, 29—Electric Heat Voltage

000	None
005	0.5 kW
010	1.0 kW
015	1.5 kW
020	2.0 kW
025	2.5 kW
030	3.0 kW
035	3.5 kW
040	4.0 kW
045	4.5 kW
050	5.0 kW
055	5.5 kW
060	6.0 kW
065	6.5 kW
070	7.0 kW
075	7.5 kW
080	8.0 kW
090	9.0 kW
100	10.0 kW
110	11.0 kW
120	12.0 kW
130	13.0 kW
140	14.0 kW

Digit 30—Electric Heat Stages

0	None
1	1 Stage
2	2 Stages Equal

Digit 31—Contactors

0	None
1	24-volt magnetic
2	24-volt mercury
3	PE with magnetic
4	PE with mercury

Digit 32—Airflow Switch

0	None
W	With

Service Model Number Description

Fan-Powered Low-Height Series Units

Digit 1, 2—Unit Type

LS VariTrane low-height series fan-powered

Digit 3—Reheat

C Cooling Only
E Electric Heat
W Hot Water Heat

Digit 4—Development Sequence

F Sixth

Digit 5, 6—Primary Air Valve

05 5" inlet (350 cfm)
06 6" inlet (500 cfm)
08 8" inlet (900 cfm)
RT (8" x 14" inlet (1800 cfm)

Digit 7, 8—Secondary Air Valve

00 N/A

Digit 9—Fan

V 08SQ 500 nominal cfm
W 09SQ 900 nominal cfm
X 10SQ 1800 nominal cfm

Digit 10, 11—Design Sequence

K0 Sixth (factory assigned)

Digit 12, 13, 14, 15—Controls

ENON No controls, field-installed DDC/electric
PNON No controls, field-installed pneumatic
DD00 Trane elec actuator only
DD01 DDC – cooling only
DD02 DDC – N.C. on/off water valve control
DD03 DDC – prop hot water valve control
DD04 DDC – on/off electric heat control
DD05 DDC – pulse-width modulation control
DD07 DDC – N.O. on/off water valve control
DD11 LonTalk DDC Controller—Cooling only
DD12 LonTalk DDC Controller w/ N.C. on/off hot water control
DD13 LonTalk DDC Controller w/ proportional hot water control
DD14 LonTalk DDC Controller–on/off electric heat control
DD15 LonTalk DDC Controller w/ pulse-width modulation electric heat control
DD17 LonTalk DDC Controller w/ N.O. on/off hot water control
FM00 FM customer actuator & control
FM01 FM Trane actuator w/ customer-supplied controller
VMA2 FM Johnson controls VMA-1420
PWR1 FM Seimens 540-100 w/ GDE131.1P actuator
PWR4 FM Seimens 540-100 Trane actuator
PWR5 FM Seimens 540-100 w/ GDE131.1U actuator
AT01 FM Automated Logic U341V+
AT02 FM Automated Logic U141V+
EI71 Analog – Series fan-powered on/off reheat
PN00 PN – N.O. Trane pneumatic actuator, R.A. stat
PN51 PN – N.O. PVR, duct pressure switch, R.A. stat
PN52 PN – N.O. PVR, dual pressure main, R.A. stat

Notes:

N.C. = *Normally-closed*
N.O. = *Normally-opened*
DA Stat = *Direct-acting pneumatic t-stat (by others)*
RA Stat = *Reverse-acting pneumatic t-stat (by others)*
PN = *Pneumatic*
FM = *Factory installation of customer-supplied controller*
PVR = *Pneumatic Volume Regulator*

Digit 16—Insulation

A 1/2" Matte-faced
B 1" Matte-faced
C 1/2" Foil-faced
D 1" Foil-faced
F 1" Double-wall
G 3/8" Closed-cell

Digit 17—Motor Type

D PSC Motor
E High-efficiency motor (ECM)

Digit 18—Motor Voltage

1 115/60/1
2 277/60/1
3 347/60/1
5 230/50/1

Digit 19—Outlet Connection

1 Flanged
2 Slip & Drive

Digit 20—Not Used

0 N/A

Digit 21—Water Coil

0 None
3 1-Row–Discharge installed, LH
4 1-Row–Discharge installed, RH
5 2-Row–DIscharge installed, LH
6 2-Row–Discharge installed, RH

Digit 22—Electrical Connections

L Left (airflow hitting you in the face)
R Right (airflow hitting you in the face)

Digit 23—Transformer

0 N/A (provided as standard)

Digit 24—Disconnect Switch

0 None
W With

Note: ***LSCF, LSWF – Toggle Disconnect LSEF – Door Interlocking Power Disconnect***

Digit 25—Power Fuse

0 None
W With

Digit 26—Electric Heat Voltage

0 None
A 208/60/1
B 208/60/3
C 240/60/1
D 277/60/1
E 480/60/1
F 480/60/3
G 347/60/1
H 575/60/3
J 380/50/3

Service Model Number Description

Fan-Powered Low-Height Series Units (con't)

Digit 27, 28, 29—Electric Heat Voltage

000	None
005	0.5 kW
010	1.0 kW
015	1.5 kW
020	2.0 kW
025	2.5 kW
030	3.0 kW
035	3.5 kW
040	4.0 kW
045	4.5 kW
050	5.0 kW
055	5.5 kW
060	6.0 kW
065	6.5 kW
070	7.0 kW
075	7.5 kW
080	8.0 kW
090	9.0 kW
100	10.0 kW
110	11.0 kW
120	12.0 kW
130	13.0 kW
140	14.0 kW
150	15.0 kW
160	16.0 kW
170	17.0 kW
180	18.0 kW

Digit 30—Electric Heat Stages

0	None
1	1 Stage
2	2 Stages Equal

Digit 31—Contactors

0	None
1	24-Volt magnetic
2	24-Volt mercury
3	PE with magnetic
4	PE with mercury

Digit 32—Air Flow Switch

0	None
W	With

General Information

Literature Contents

This manual describes the installation of VariTrane VAV units with recommended wiring, piping, and mounting of Single-Duct, Dual-Duct, Fan-Powered, Low-Height terminal units and diffusers.

Receiving and Handling

VariTrane Units are shipped completely assembled with the exceptions of optional attenuators for fan-powered units and accessories.

Upon receiving the equipment, complete the following:

- Locate the nameplate and refer to the model and sales order number and check that the correct units have been delivered.
- Inspect the control enclosures and air valve casing for dents or punctures.
- Verify that all options have been included, such as filters, controls, heating coils, water valves, etc. Also check that the unit voltages agree with the building parameters.
- Manually rotate the fan (if applicable) to assure that there are no obstructions within the housing.
- Claims for in-transit damage must be filed immediately with the delivery carrier.
- For hot water re-heat units, check the coil fins and make sure that coils are not damaged.
- Locate and verify that the correct zone sensors are with the order. These will be marked with an orange "Accessories Enclosed" label. Store in a secure location until needed. Accessories lost at the jobsite are NOT covered by Trane's warranty.
- If a discrepancy occurs between what was ordered and what is received, contact you local Trane representative immediately.
- Read the appropriate section in this manual for installation procedures prior to actual starting of equipment.

  Upon receiving the equipment, please inspect each unit and components for external or internal damage. Refer to the bill of lading to insure all equipment and accessories have been received. Contact your local Trane sales representative and notify the trucking company immediately of any short ship or damaged equipment.

NOTICE:

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

⚠ WARNING – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION – Indicates a situation that may result in equipment or property-damage-only accidents.

TRANE®

Unit Information

Single-Duct Units

The basic unit consists of a sheet metal casing with an air valve, which is used to modulate the air being delivered into the occupied zone. The unit is designed to modulate either cooling or heating air between the temperatures of 40°F and 140°F. Air enters the air valve through the round or rectangular inlet and exits into the sheet metal casing to be distributed to the zone either through integral round outlets in the casing or through rectangular duct attached to the discharge of the unit.

The basic unit can also be ordered with factory-mounted electric or hot water heating coils attached to the discharge. (See Figure 1.)

These re-heat units are used primarily to reheat air-to-zone temperature when the load in the occupied space is low.

Primary air is modulated through the VariTrane air valve by rotating the damper blade. All air valves have a round/rectangular inlet for easy fit-up with incoming ductwork.

Figure 1 – Typical Single-Duct Units

VCCF

VCWF

VCEF

Dual-Duct Units

Dual-duct units provide two air valves: one as heating primary air and the other as cooling primary air. Both discharge into the common outlet, which leads to the zone being controlled. (See Figure 2.)

The units are provided with a slip and drive rectangular duct connection or can be ordered with integral outlet plenum.

Sequencing of the hot and cold air valve is dependent upon job requirements. One typical control is the valves working in conjunction with each other to respond to zone temperature.

When the cooling valve becomes fully closed or reaches a specified minimum, then the heating valve will begin to modulate or vice versa. The typical result is that air flowing to the zone varies from the maximum down to a minimum and back up to a maximum as the load varies and as the controls would cause one air valve to close and the other to open.

Another typical application is when the unit provides a constant volume to the zone. When the zone sensor is tied directly to the heating valve, it will modulate the heating valve according to the zone temperature.

When the heating valve is fully closed or there is a call for cooling in the zone, the cooling valve will be at constant supply. As the space becomes too cool, the heating valve will modulate open, decreasing the cooling valve flow. The typical result is that the air flowing into the zone stays at a constant flow whether the unit is heating or cooling.

Figure 2 – Typical Dual-Duct Unit

VDDF

Unit Information

Fan-Powered and Fan-Powered Low-Height Units

VariTrane fan-powered and low-height fan-powered units can be either parallel or series, with or without re-heat. (See Figure 3.)

The fan on a series unit runs continuously whenever the main air handler unit is in operation. There are various options for starting the fan. The fan can be started three ways: 1) remotely, 2) by a duct pressure switch, or 3) by a combination of both. The particular fan control method may vary from unit to unit, depending upon job needs.

Typically, the heater is off while the air valve modulates primary air and responds to zone temperature. If zone temperature decreases to the point where a decrease in primary air will not maintain the desired temperature, the re-heat will be activated to increase the temperature of the discharge air.

On a parallel unit, the VariTrane air valve delivers primary cooling air to the unit outlet. When the space temperature decreases beyond air valve control, the fan is turned on as the first stage of heat. The fan delivers plenum air from above the occupied space to the unit outlet, which is mixed with primary air and delivered to the occupied space.

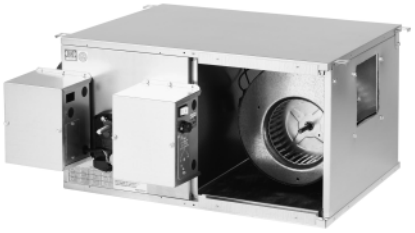
Note: Either the fan, the air valve, or both can deliver airflow into the occupied space. In order to prevent primary airflow from exiting through the fan when the fan is not running on a parallel unit, a back draft damper is provided. When the fan is not running, the efficiency of this system is the same as a standard single-duct VAV unit.

Typically, the control systems applied to parallel units cause the air valve to close to zero or a minimum flow before the fan is activated. After the fan is activated, the optional heat will be activated upon further reduction in zone temperature. Therefore, minimal primary air is mixed with the heated air.

VariTrane fan-powered unit fan sizes 02SQ–05SQ and 08SQ–10SQ were performance tested at .12 in. w.g. and sizes 06SQ and 07SQ were tested at .15 in. w.g. Units are not designed to operate unducted and below these tested static pressures.

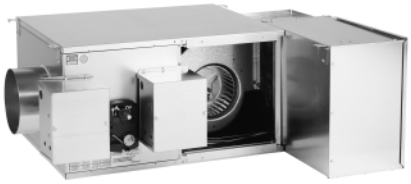
Note: Fan-powered units are available with rectangular discharge connection only. The optional heater is mounted on the discharge of the unit. Hot water coils are connected to either the plenum inlet or on the discharge on parallel units, and to the discharge of series units.

Figure 3 – Typical Fan-Powered Units



VSCF

VPCF



VSEF

VPEF

VSWF

VPWF

Unit Installation

Due to their weight, the VAV terminal units should be suspended from the uppermost ceiling, independent of the false ceiling grid. Suspension devices are to be supplied by the installer. Units must be installed level and upright. Failure to level the unit properly may prevent proper operation of the controls and/or terminal unit. Units are not designed to be installed vertically. Consequently, this will also void the UL ratings and any warranty on the unit.

Single-Duct

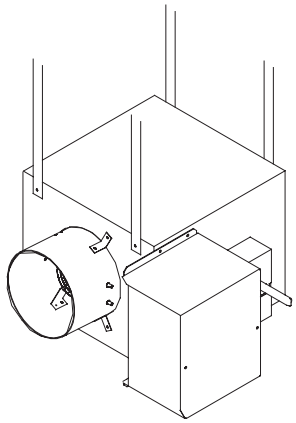
Depending upon the size and weight of the single-duct unit, it may be capable of being supported by the ductwork that is connected to it. No hanger brackets are provided on these units since the unit should be supported by means of a hanger strap. The hanger strap should be secured directly to the unit casing as shown in Figure 4.

For cooling only single-duct units or single-duct units with hot water coil, the unt may be rotated 180° for opposite side connections.

For units with electric heat, the unit must be ordered from the factory designating either right- or left-hand connections.

Figure 4

Single-Duct Hanging Recommendations

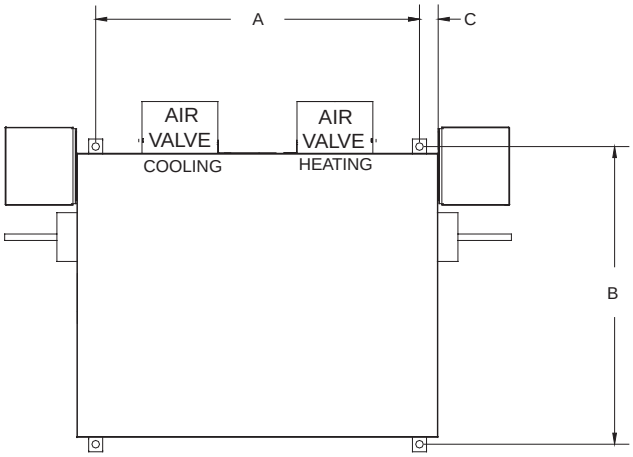


Dual-Duct

Dual-duct units should be supported by either hanger straps or by using a threaded rod in conjunction with the hanger brackets that are provided on the unit. See Figure 5.

Figure 5

Dual-Duct Hanger Bracket Locations



TOP VIEW

Inlet Size	A	B	C
5" thru 10"	23.154" (588 mm)	25.25" (641 mm)	1.376" (35 mm)
12" thru 16"	25.154" (639 mm)	37.25" (946 mm)	1.376" (35 mm)

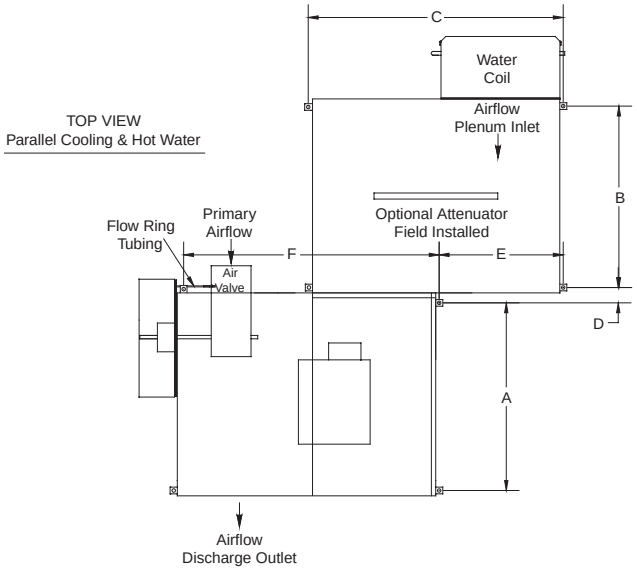
Unit Installation

Fan-Powered (Standard and Low-Height)

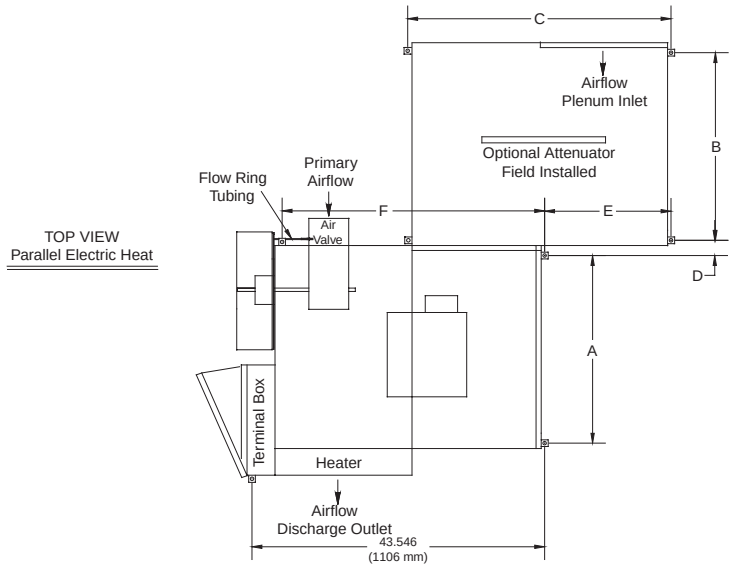
Fan-powered units should be supported by either hanger straps or by using a threaded rod in conjunction with the hanger brackets that are provided on the unit. Care should be exercised to insure that the hanging straps do not block the side access panel. See Figures 6–13.

Figure 6

Parallel Hanger Bracket Locations Sizes



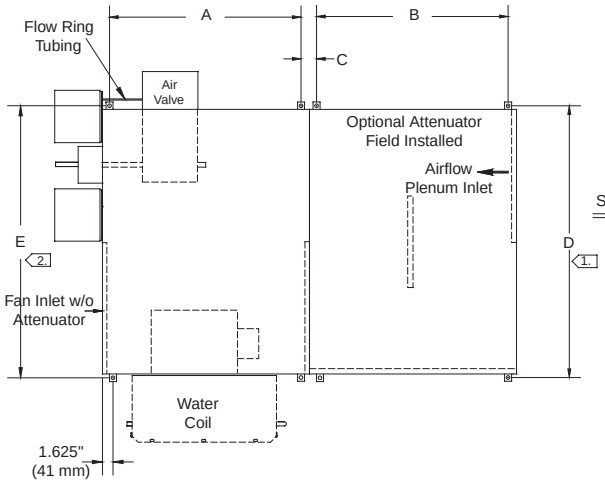
FAN SIZE	A	B	C	D	E	F
02SQ	26.75" (679 mm)	26.75" (679 mm)	41.154" (1041 mm)	3.25" (83 mm)	20.00" (508 mm)	38.95" (989 mm)
03SQ, 04SQ, 05SQ	29.75" (756 mm)	26.75" (679 mm)	41.154" (1041 mm)	3.25" (83 mm)	20.00" (508 mm)	38.95" (989 mm)
06SQ, 07SQ	36.75" (933 mm)	26.75" (679 mm)	41.154" (1041 mm)	3.25" (83 mm)	20.00" (508 mm)	38.95" (989 mm)



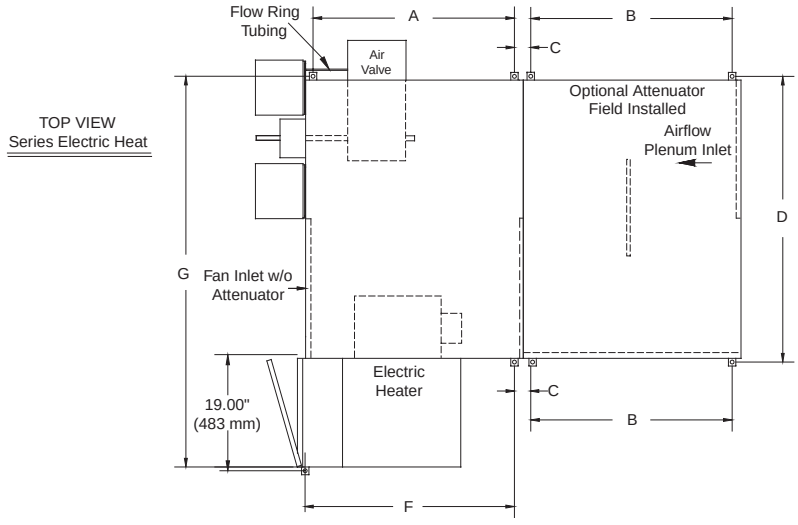
Unit Installation

Figure 7

Series Hanger Bracket Locations



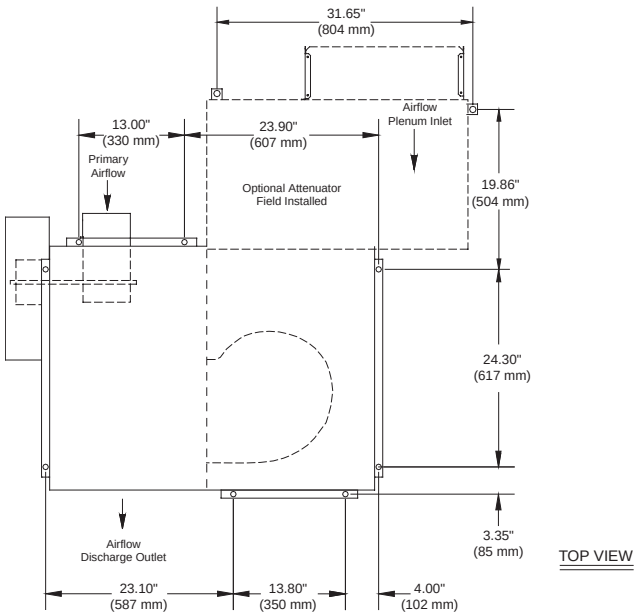
FAN SIZE	A	B	C	D	E	F (Elec. Heat Only)
02SQ	18.75" (476 mm)	26.75" (679 mm)	3.25" (83 mm)	41.154" (1041 mm)	35.154 (740 mm)	20.132" (511 mm)
03SQ, 04SQ	20.75" (527 mm)	26.75" (679 mm)	3.25" (83 mm)	41.154" (1041 mm)	41.154" (1041 mm)	23.875 (606 mm)
05SQ	27.25" (692 mm)	26.75" (679 mm)	3.25" (83 mm)	41.154" (1041 mm)	41.154" (1041 mm)	29.875" (759 mm)
06SQ, 07SQ	27.25" (692 mm)	26.75" (679 mm)	3.25" (83 mm)	41.154" (1041 mm)	41.154" (1041 mm)	29.875" (759 mm)

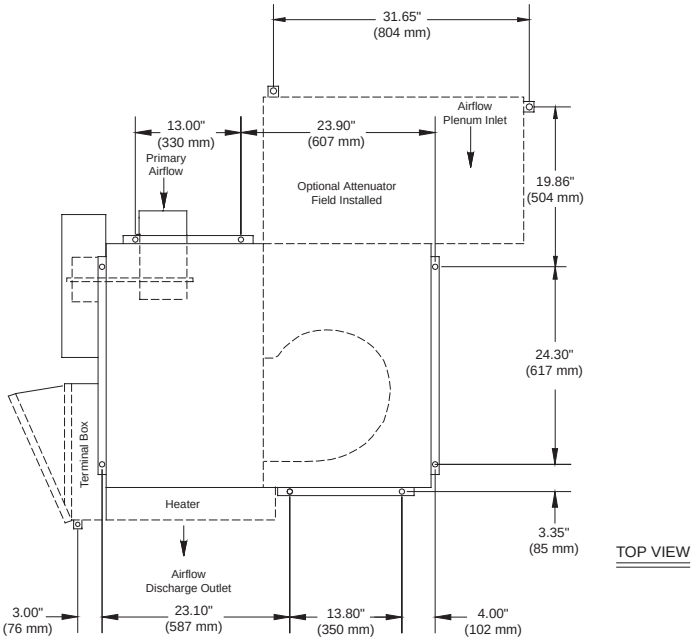


Unit Installation

Figure 8

Low-Height Parallel 08SQ/09SQ w/ Hot Water or Electric Heat

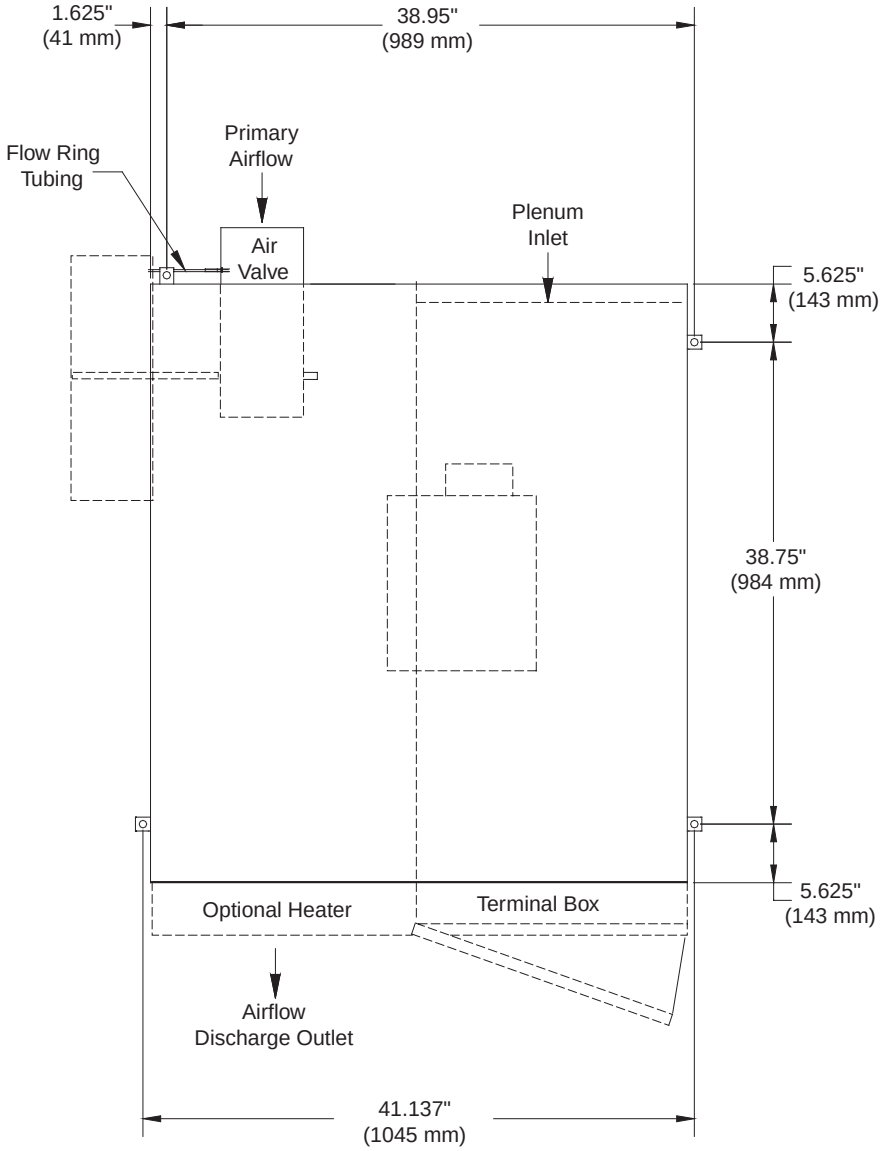




Unit Installation

Figure 9

Low-Height Parallel10SQ

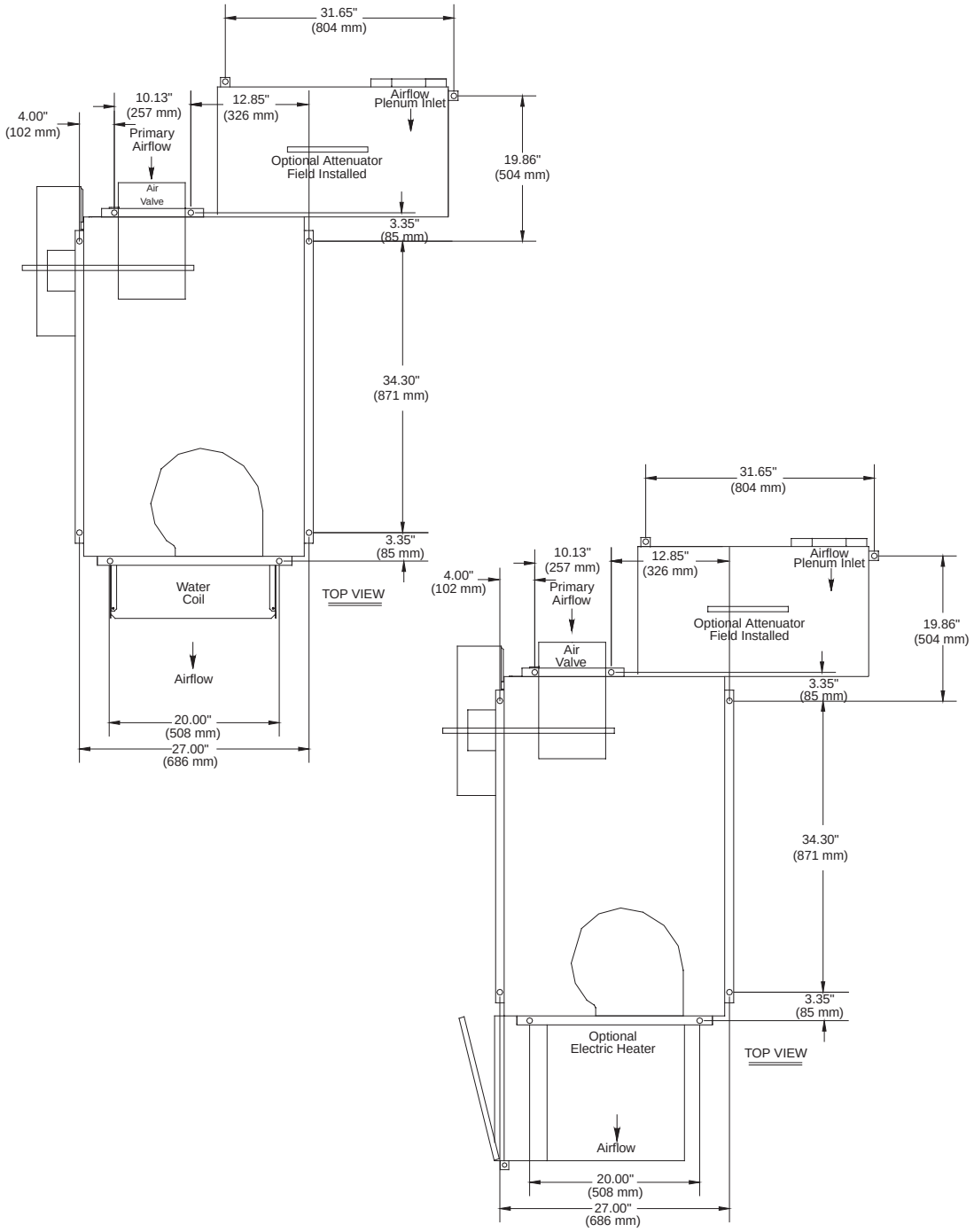


TOP VIEW

Unit Installation

Figure 10

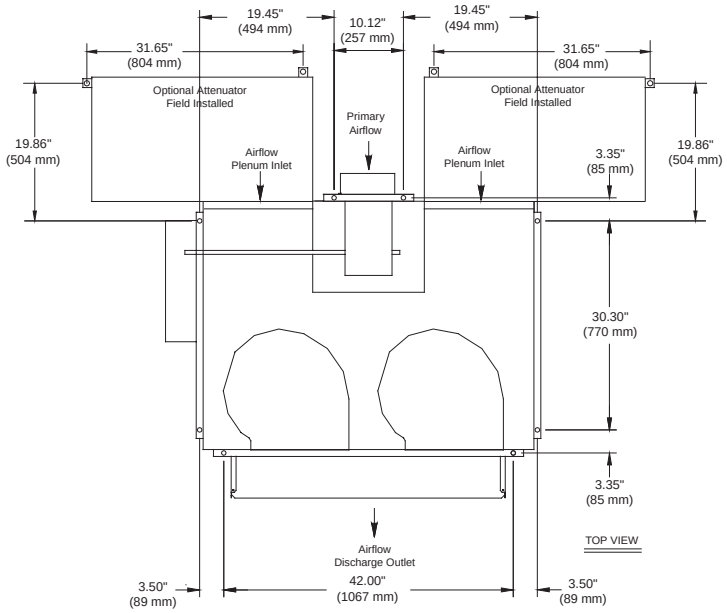
Low-Height Series 08SQ/09SQ w/ Hot Water or Electric Heat

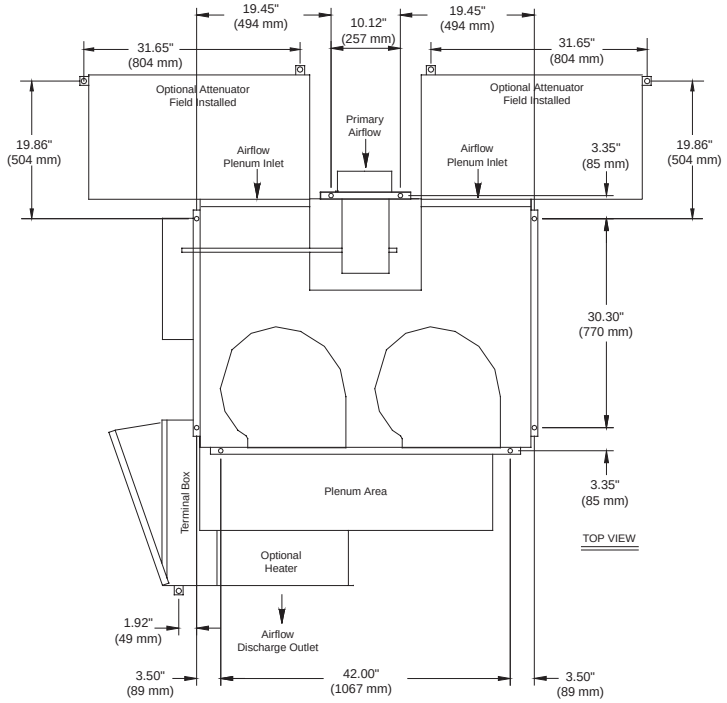


Unit Installation

Figure 11

Low-Height Series 10SQ w/ Hot Water or Electric Heat



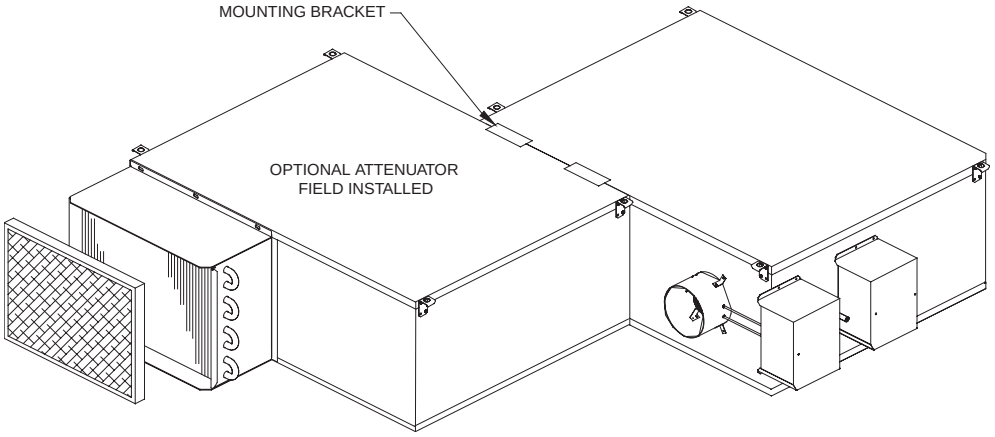


Unit Installation

Figure 12

Attenuator Installation—Parallel Units

1. Attach attenuator to unit as shown with provided mounting brackets.



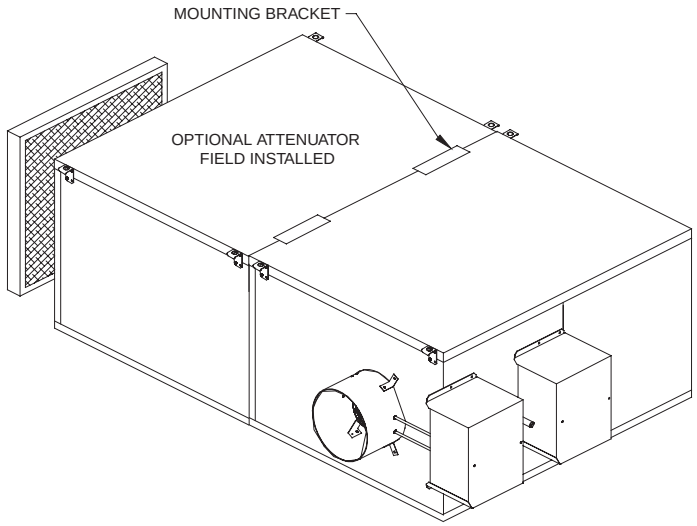
Note: Bottom bracket not shown. Bottom bracket to be installed in same orientation on bottom of unit.

Unit Installation

Figure 13

Attenuator Installation—Series Units

1. Attach attenuator to unit as shown with provided mounting brackets.



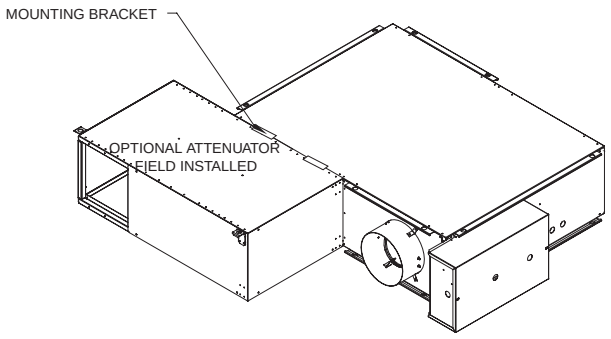
Note: Bottom bracket not shown. Bottom bracket to be installed in same orientation on bottom of unit.

Unit Installation

Figure 14

Attenuator Installation—Low-Height Parallel Units

1. Attach attenuator to unit as shown with provided mounting brackets.



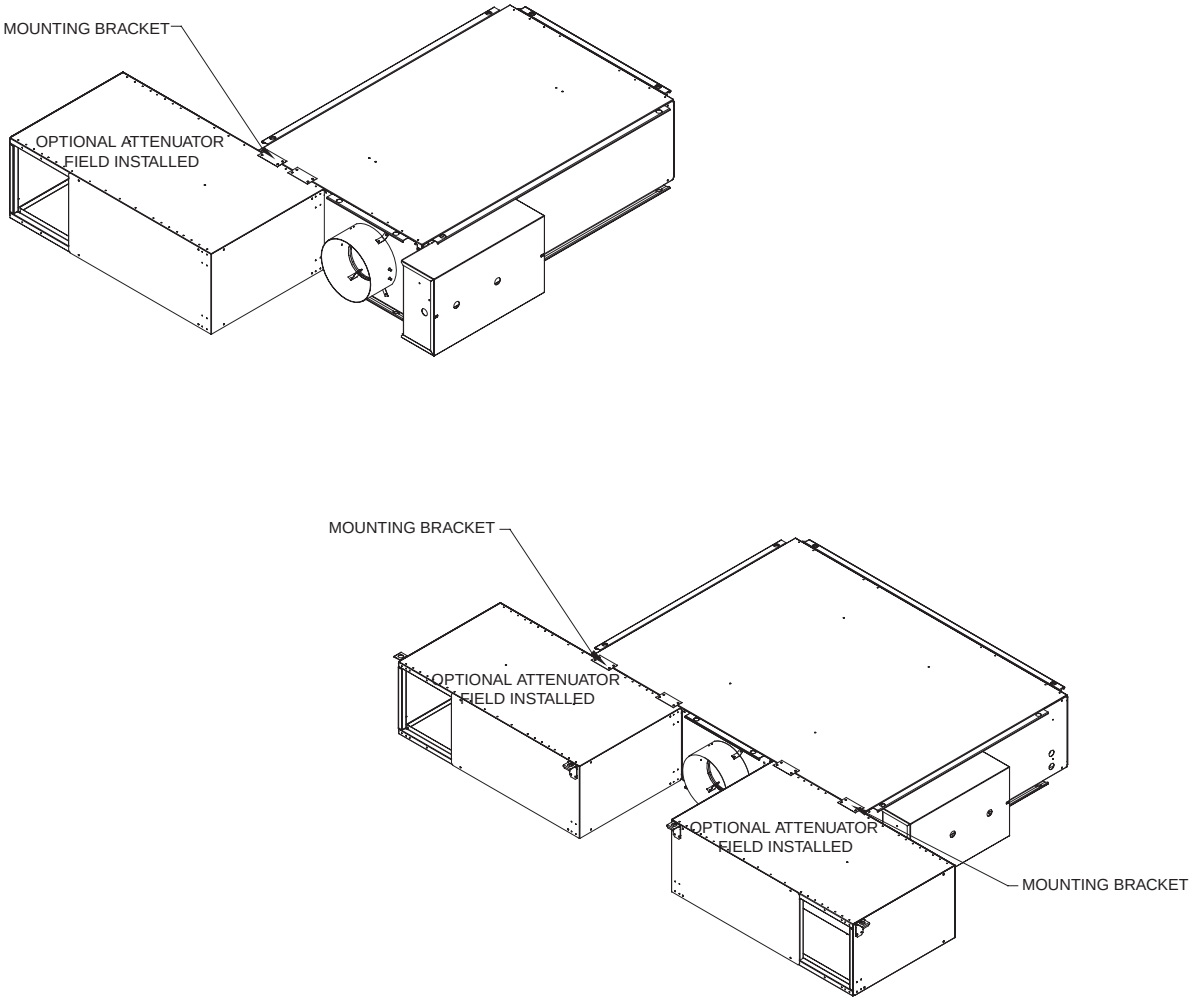
Note: Bottom bracket not shown. Bottom bracket to be installed in same orientation on bottom of unit.

Unit Installation

Figure 15

Attenuator Installation—Low-Height Series Units

1. Attach attenuator to unit as shown with provided mounting brackets.



Note: Bottom bracket not shown. Bottom bracket to be installed in same orientation on bottom of unit.

TRANE

Unit Installation

Chart 1 – Unit Weights

Single-Duct Units

Unit Size	VCCF (lbs/kg)	VCCF w/ Dual Wall (lbs/kg)	VCEF (lbs/kg)	VCEF w/ Dual Wall (lbs/kg)	VCWF 1-Row (lbs/kg)	VCWF 2-Row (lbs/kg)	VCWF 1-Row w/ Dual Wall (lbs/kg)	VCWF 2-Row w/ Dual Wall (lbs/kg)
4	16/7	19/9	38/17	48/22	21/10	22/10	24/11	25/11
5	16/7	19/9	38/17	48/22	21/10	22/10	24/11	25/11
6	16/7	19/9	38/17	48/22	21/10	22/10	24/11	25/11
8	16/7	20/9	38/17	49/22	21/10	24/11	25/11	28/13
10	22/10	27/12	46/21	60/27	29/13	32/15	34/15	37/17
12	27/12	34/15	52/24	68/31	37/17	40/18	43/20	47/21
14	32/15	41/19	60/27	80/36	44/20	48/22	53/24	57/26
16	35/16	46/21	69/31	91/41	49/22	54/24	60/27	65/29
24	52/24	63/29	84/38	106/48	70/32	77/35	81/37	88/40

Dual-Duct Units

Unit Size	VDDF (lbs/kg)	VDDF w/ Dual Wall (lbs/kg)
0505	54/24	68/31
0506	54/24	68/31
0606	54/24	68/31
0508	55/25	68/31
0608	55/25	69/31
0510	56/25	69/31
0808	56/25	70/32
0610	56/25	70/32
0810	57/26	70/32
1010	61/28	74/34
0612	57/26	70/32
0812	58/26	71/32

Unit Size	VDDF (lbs/kg)	VDDF w/ Dual Wall (lbs/kg)
1012	59/27	72/33
1212	60/27	84/38
0814	78/35	102/46
1014	79/36	103/47
1214	80/36	104/47
1414	81/37	105/48
0816	79/36	103/47
1016	80/36	104/47
1216	81/37	105/48
1416	82/37	105/48
1616	83/38	106/48

Parallel Fan-Powered Units

Unit Size	VPCF (lbs/kg)	VPCF w/ Dual Wall (lbs/kg)	VPEF (lbs/kg)	VPEF w/ Dual Wall (lbs/kg)	VPWF 1-Row (lbs/kg)	VPWF 2-Row (lbs/kg)	VPWF 1-Row w/ Dual Wall (lbs/kg)	VPWF 2-Row w/ Dual Wall (lbs/kg)	VPxF Attenuator (lbs/kg)
0502SQ	81/37	115/52	110/550	144/65	92/42	95/43	126/57	129/59	46/21
0602SQ	80/36	114/52	109/49	143/65	91/41	94/43	125/57	128/58	46/21
0603SQ	83/38	117/53	112/51	146/66	105/48	108/49	139/63	142/64	48/22
0802SQ	81/37	115/52	110/50	144/65	92/42	95/43	126/57	129/59	46/21
0803SQ	83/38	117/53	112/51	146/66	105/48	108/49	139/63	142/64	48/22
0804SQ	84/38	118/54	113/51	147/67	106/48	109/49	140/64	143/65	48/22
1002SQ	82/37	116/53	111/50	145/66	93/42	96/44	127/58	130/59	46/21
1003SQ	84/38	118/54	113/51	147/67	106/48	109/49	140/64	143/65	48/22
1004SQ	85/39	119/54	114/52	148/67	107/49	110/50	141/64	144/65	48/22
1005SQ	98/44	132/60	128/58	162/73	120/54	123/56	154/70	157/71	48/22
1006SQ	114/52	148/67	144/65	178/81	127/58	130/59	161/73	164/74	54/24
1007SQ	122/55	156/71	152/69	186/84	135/61	138/63	169/77	172/78	54/24
1203SQ	85/39	119/54	114/52	148/67	107/49	110/50	141/64	144/65	48/22
1204SQ	86/39	120/54	115/52	149/68	108/49	111/50	142/64	145/66	48/22
1205SQ	99/45	133/60	129/59	163/74	121/55	124/56	155/70	158/72	48/22
1206SQ	115/52	149/68	145/66	179/81	128/58	131/59	162/73	165/75	54/24
1207SQ	123/56	157/71	153/69	187/85	136/62	139/63	170/77	173/78	54/24
1404SQ	87/39	121/55	116/53	150/68	109/49	112/51	143/65	146/66	48/22
1405SQ	100/45	134/61	130/59	164/74	122/55	125/57	156/71	159/72	48/22
1406SQ	116/53	150/68	146/66	180/82	129/59	132/60	163/74	166/75	54/24
1407SQ	124/56	158/72	154/70	188/85	137/62	140/64	171/78	174/79	54/24
1606SQ	117/53	151/68	147/67	181/82	130/59	133/60	164/74	167/76	54/24
1607SQ	125/57	159/72	155/70	189/86	138/63	141/64	172/78	175/79	54/24

TRANE®

Unit Installation

Chart 1 – Unit Weights (Con't.)

Series Fan-Powered

Unit Size	VSCF (lbs/kg)	VSCF w/ Dual Wall (lbs/kg)	VSEF (lbs/kg)	VSEF w/ Dual Wall (lbs/kg)	VSWF 1-Row (lbs/kg)	VSWF 2-Row (lbs/kg)	VSWF 1-Row w/ Dual Wall (lbs/kg)	VSWF 2-Row w/ Dual Wall (lbs/kg)	VSxF Attenuator (lbs/kg)
0402SQ	78/35	93/42	104/47	119/54	85/39	87/39	100/45	102/46	46/21
0502SQ	78/35	93/42	104/47	119/54	85/39	87/39	100/45	102/46	46/21
0602SQ	77/35	92/42	103/47	118/54	84/38	86/39	99/45	101/46	46/21
0603SQ	76/34	100/45	105/48	129/59	88/40	92/42	112/51	116/53	48/22
0604SQ	87/39	111/50	116/53	140/64	99/45	103/47	123/56	127/58	48/22
0802SQ	79/36	94/43	105/48	120/54	86/39	88/40	101/46	103/47	46/21
0803SQ	77/35	101/46	106/48	130/59	89/40	93/42	113/51	117/53	48/22
0804SQ	88/40	112/51	117/53	141/64	100/45	104/47	124/56	128/58	48/22
1002SQ	81/37	96/44	107/49	122/55	88/40	90/41	103/47	105/48	46/21
1003SQ	80/36	104/47	109/49	133/60	92/42	96/44	116/53	120/54	48/22
1004SQ	91/41	115/52	120/54	144/65	103/47	107/49	127/58	131/59	48/22
1005SQ	92/42	116/53	121/55	145/66	104/47	108/49	128/58	132/60	48/22
1006SQ	104/47	133/60	135/61	164/74	119/54	124/56	148/67	153/69	54/24
1007SQ	117/53	146/66	148/67	177/80	132/60	137/62	161/73	166/75	54/24
1203SQ	82/37	106/48	111/50	135/61	94/43	98/44	118/54	122/55	48/22
1204SQ	92/42	116/53	121/55	145/66	104/47	108/49	128/58	132/60	48/22
1205SQ	94/43	118/54	123/56	147/67	106/48	110/50	130/59	134/61	48/22
1206SQ	105/48	134/61	136/62	165/75	120/54	125/57	149/68	154/70	54/24
1207SQ	118/54	147/67	149/68	178/81	133/60	13863	162/73	167/76	54/24
1404SQ	93/42	117/53	122/55	146/66	105/48	109/49	129/59	133/60	48/22
1405SQ	96/44	120/54	125/57	149/68	108/49	112/51	132/60	136/62	48/22
1406SQ	106/48	135/61	137/62	166/75	121/55	126/57	150/68	155/70	54/24
1407SQ	119/54	148/67	150/68	179/81	134/61	139/63	163/74	168/76	54/24
1606SQ	107/49	136/62	138/63	167/76	122/55	127/58	151/68	156/71	54/24
1607SQ	120/54	149/68	151/68	180/82	135/61	140/64	164/74	169/77	54/24

Low-Height Parallel Units

Unit Size	LPCF (lbs/kg)	LPCF w/ Dual Wall (lbs/kg)	LPEF (lbs/kg)	LPEF w/ Dual Wall (lbs/kg)	LPWF 1-Row (lbs/kg)	LPWF 2-Row (lbs/kg)	LPWF 1-Row w/ Dual Wall (lbs/kg)	LPWF 2-Row w/ DualWall (lbs/kg)	LPxF Attenuator (lbs/kg)
0508SQ	69/31	89/40	84/38	104/47	78/35	81/37	98/44	101/46	10/5
0608SQ	68/31	88/40	83/38	103/47	77/35	80/36	97/44	100/45	10/5
0609SQ	73/33	93/42	88/40	108/49	82/37	85/39	102/46	105/48	10/5
0808SQ	69/31	89/40	84/38	104/47	78/35	81/37	98/44	101/46	10/5
0809SQ	74/34	94/43	89/40	109/49	83/38	86/39	103/47	106/48	10/5
0810SQ	90/41	110/50	105/48	125/57	99/45	102/46	119/54	122/55	10/5
14RT09SQ	83/38	103/47	98/44	118/54	92/42	95/43	112/51	115/52	10/5
14RT10SQ	97/44	117/53	112/51	132/60	106/48	109/49	126/57	129/59	10/5

Low-Height Series Units

Unit Size	LSCF (lbs/kg)	LSCF w/ Dual Wall (lbs/kg)	LSEF (lbs/kg)	LSEF w/ Dual Wall (lbs/kg)	LSWF 1-Row (lbs/kg)	LSWF 2-Row (lbs/kg)	LSWF 1-Row w/ Dual Wall (lbs/kg)	LSWF 2-Row w/ Dual Wall (lbs/kg)	LSxF Attenuator (lbs/kg)
0508SQ	71/32	86/39	86/39	101/45	80/36	82/37	95/43	97/44	10/5
0608SQ	70/32	85/39	85/39	100/45	79/36	81/37	94/43	96/44	10/5
0609SQ	80/36	95/43	95/43	110/50	89/40	91/41	104/47	106/48	10/5
0808SQ	71/32	86/39	86/39	101/46	80/36	82/37	95/43	97/44	10/5
0809SQ	81/37	96/44	96/44	111/50	90/41	92/42	105/48	107/49	10/5
0810SQ	95/43	120/54	120/54	145/66	111/50	115/52	136/62	140/64	20/9
14RT09SQ	90/41	105/48	105/48	120/54	99/45	101/46	114/52	116/53	10/5
14RT10SQ	105/48	130/59	130/59	155/70	121/55	125/57	146/66	150/68	20/9

Unit Installation

Duct Connections

All VariTrane units should be provided with a minimum of 1.5-duct diameters of straight duct prior to the inlet of the unit. It is recommended that at least 48 inches of straight duct be provided from the discharge of the units prior to any take-offs or transitions. **This is a requirement for electric heat fan-powered units used in applications with 100% downward discharge.**

Note: In order to maintain the UL rating for VariTrane electric coils, there must be four feet of straight unlined ductwork downstream of the reheat coil prior to any diffuser takeoffs.

After all connections are made, check that the entire ductwork system is airtight. In some high-pressure systems, duct sealer may be necessary.

Provide insulation around the entire inlet collar (all the way to the unit casing).

Use caution not to damage the flow tubes when making ductwork connections or insulating.

Cut "slits" in the insulation for the flow tubes and secure with duct tape.

If the unit is to be installed in a location with high humidity, external insulation around the heating coil should be installed as required.

Water Coil Connections

Water coil piping connections will be 3/8" or 7/8" OD.

If necessary, you can change the coil connection from left-handed to right-handed (and vice-versa) by disconnecting the coil from the unit and rotating the coil "like a steering wheel" 180°.

The inlet piping should always be connected to the bottom connection of the coil regardless of handedness.

Care should be taken to properly support the water coil piping connections while connecting the adjoining pipe.

It is recommended that piping to the water coil should be done after field-mounted controls, external insulation, and ductwork connections have been completed.

Do not connect water valve or pipe extensions to the water coil connections unless supported.

Unit Accessibility

Single-duct and dual-duct units provided with hot water reheat have an access panel located on the side of the water coil. All other single-duct and dual-duct units are provided without access, as all functioning components are external to the unit.

Fan-powered terminals are provided with a sliding side access.

Low-height terminal units have a removable bottom panel.

Clearances

For proper service, it is recommended that at least 36" of side clearance be provided to service and access single-duct and dual-duct terminals units.

Fan-powered VAV units have a plenum inlet that must be clear of obstructions. Allow at least 36" of clearance in front of the side access and plenum opening.

Low-height fan-powered terminals require the same plenum clearance requirement that applies to the standard fan-powered units. However the access to the internal components is located on the bottom of the unit.

It is also recommended that 6" of clearance be provided to the top and bottom of all the units.

Note: The minimum clearance for controls and heater controls should be 36" for all models except units with 575-volt electric heaters, which require 48" of clearance. NEC and/or local codes override all clearance requirements.

Actuator Mounting

Trane offers a factory-mounted actuator with a 90-second drive time. The actuator drives 1 degree per second. A field-installed actuator may be used if desired. The actuator shaft has a ½-inch diameter and is designed to travel clockwise to close the damper and counter-clockwise to open the damper. There is an indicator on the end of the actuator shaft that can be used to determine the position of the damper.

⚠ CAUTION

Equipment Damage

Note: When installing or replacing the actuator tighten the actuator set screw per the manufacturer's instructions. Failure to follow the manufacturer's specifications may result in unit malfunction.

TRANE®

Unit Setup

Chart 2 – Flow Sensor Delta P vs. Airflow Delivery

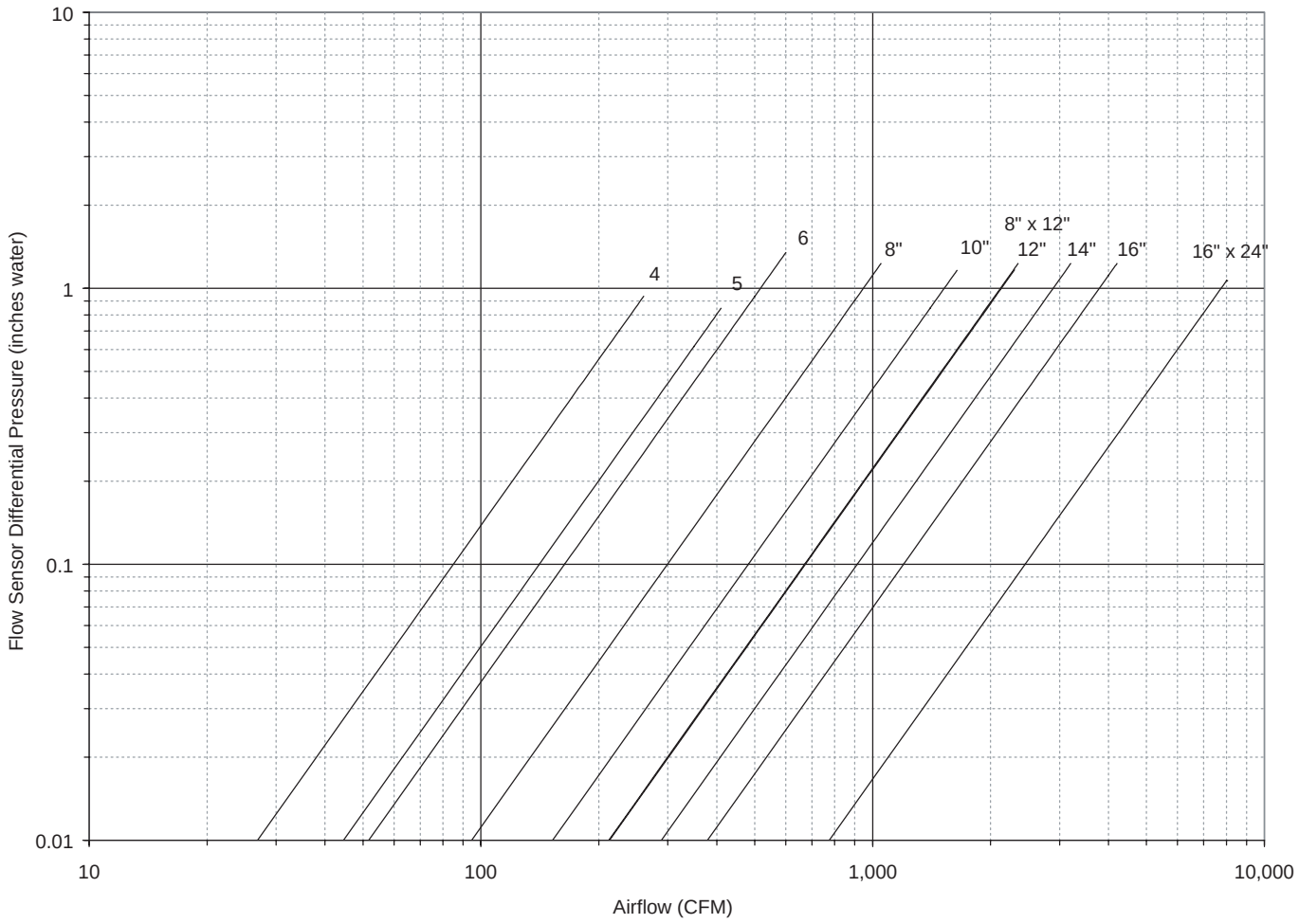


Chart 3– Fan Motor Amperage

Maximum PSC Fan Motor Amperage (FLA)

Fan Size	HP VAC	115 VAC	277 VAV	347 VAC	208
Parallel/Series 02SQ	1/8	1.6	0.7	.7	—
Parallel/Series 03SQ	1/3	4.3	1.6	1.4	—
Parallel/Series 04SQ	1/3	5.5	2.0	1.8	—
Parallel/Series 05SQ	1/2	6.7	2.4	2.2	—
Parallel/Series 06SQ	1/2	—	3.8	3.3	4.6
Parallel/Series 07SQ	1	—	4.7	3.8	6.6
Low-height Parallel/Series 08SQ	1/3	5.5	2.5	1.8	—
Low-height Parallel/Series 09SQ	1/3	5.5	2.5	1.8	—
Series Low-height 10SQ	2 x 1/8	11.0	5.0	3.5	—
Parallel Low-Height 10SQ	2 x 1/8	9.4	3.5	3.0	

Maximum ECM Fan Motor Amperage (FLA)

Fan Size	HP VAC	115 VAC	277 VAV
Parallel/Series 03SQ	1/3	4.5	2.4
Parallel/Series 04SQ	1/2	6.5	3.5
Parallel/Series 05SQ	1	10.1	5.4
Parallel/Series 06SQ	1	9.5	5.1
Low-height Parallel/Series 08SQ	1/2	2.0	1.1
Low-height Parallel/Series 09SQ	1/2	6.7	3.6
Low-height Series 10SQ	2 x 1/2	7.5	4.0

Unit Setup

(SCR) Motor Speed Control Adjustment Procedure.

In order to make units more convenient and efficient to balance, an SCR (silicone control rectifier) is provided as standard on all fan-powered units.

The SCR is located on the side of the fan control box. To adjust the speed of the motor, the external knob must be rotated either clockwise or counterclockwise depending on the desired speed adjustment.

There is an internal potentiometer (Figure 14) setting on the SCR controller that can be accessed by removing the control box cover. This internal potentiometer is set at the factory to the specific motor voltage.

It may be necessary to adjust this in the field depending on the building's power factor.

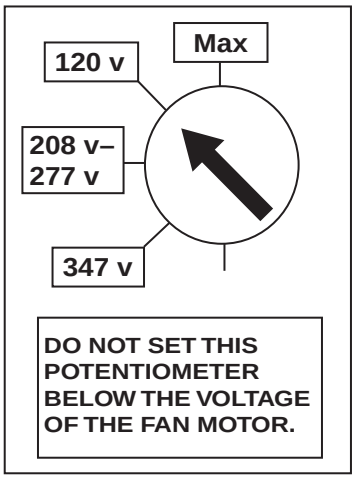
⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

Figure 16 – SCR

Figure 17 – Internal Potentiometer



NOTE: Do not set this potentiometer below the voltage of the fan motor.

Electrically Commutated Motor (ECM)

Trane offers an energy efficient ECM motor as a motor option. Balancing of an ECM motor is accomplished through electronic control adjustments on the ECM control board (see Figure 15). Potentiometer settings for a multitude of CFM settings are given in Charts 4–15. Other potentiometer settings can be determined either by interpolating from these tables or by using the following equation:

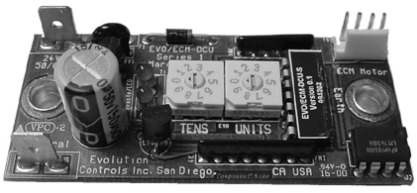
CFMsetting = CFMmin + {(Potentiometer Setting) x [(CFMmax - CFMmin)/100]}

There is an LED on the ECM control board, which will blink one time for every 100 CFM of motor setting. For example, the LED on a unit set for 790 CFM will blink 7 times. The LED on a unit set for 800 CFM will blink 8 times.

NOTE: This feature only verifies that the CFM is set properly. This feature does not indicate at what speed the motor is actually running.

The ECM must be "load tested." In other words, the fan must be connected to properly test the ECM.

Figure 18 – ECM Control Board



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Unit Setup

Chart 4 – VPxF 03SQ ECM CFM Table

VPxF 03SQ

Motor Min CFM: 160
Motor Max CFM: 1085

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
160	76	1	0	1
170	80	2	0	2
179	84	3	0	3
188	89	4	0	4
198	93	5	0	5
207	98	6	0	6
216	102	7	0	7
226	107	8	0	8
235	111	9	0	9
244	115	10	1	0
254	120	11	1	1
263	124	12	1	2
272	129	13	1	3
282	133	14	1	4
291	137	15	1	5
300	142	16	1	6
310	146	17	1	7
319	151	18	1	8
328	155	19	1	9
338	159	20	2	0
347	164	21	2	1
356	168	22	2	2
366	173	23	2	3
375	177	24	2	4
385	181	25	2	5
394	186	26	2	6
403	190	27	2	7
413	195	28	2	8
422	199	29	2	9
431	204	30	3	0
441	208	31	3	1
450	212	32	3	2
459	217	33	3	3
469	221	34	3	4
478	226	35	3	5
487	230	36	3	6
497	234	37	3	7
506	239	38	3	8
515	243	39	3	9
525	248	40	4	0
534	252	41	4	1
543	256	42	4	2
553	261	43	4	3
562	265	44	4	4
571	270	45	4	5
581	274	46	4	6
590	278	47	4	7
599	283	48	4	8
609	287	49	4	9
618	292	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
627	296	51	5	1
637	300	52	5	2
646	305	53	5	3
655	309	54	5	4
665	314	55	5	5
674	318	56	5	6
683	323	57	5	7
693	327	58	5	8
702	331	59	5	9
711	336	60	6	0
721	340	61	6	1
730	345	62	6	2
739	349	63	6	3
749	353	64	6	4
758	358	65	6	5
767	362	66	6	6
777	367	67	6	7
786	371	68	6	8
795	375	69	6	9
805	380	70	7	0
814	384	71	7	1
823	389	72	7	2
833	393	73	7	3
842	397	74	7	4
852	402	75	7	5
861	406	76	7	6
870	411	77	7	7
880	415	78	7	8
889	419	79	7	9
898	424	80	8	0
908	428	81	8	1
917	433	82	8	2
926	437	83	8	3
936	442	84	8	4
945	446	85	8	5
954	450	86	8	6
964	455	87	8	7
973	459	88	8	8
982	464	89	8	9
992	468	90	9	0
1001	472	91	9	1
1010	477	92	9	2
1020	481	93	9	3
1029	486	94	9	4
1038	490	95	9	5
1048	494	96	9	6
1057	499	97	9	7
1066	503	98	9	8
1076	508	99	9	9
1085	512	100	0	0

Unit Setup

Chart 5 – VPxF 04SQ ECM CFM Table

VPxF 04SQ

Motor Min CFM: 220
Motor Max CFM: 1510

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
220	104	1	0	1
233	110	2	0	2
246	116	3	0	3
259	122	4	0	4
272	128	5	0	5
285	135	6	0	6
298	141	7	0	7
311	147	8	0	8
324	153	9	0	9
337	159	10	1	0
350	165	11	1	1
363	171	12	1	2
376	178	13	1	3
389	184	14	1	4
402	190	15	1	5
415	196	16	1	6
429	202	17	1	7
442	208	18	1	8
455	215	19	1	9
468	221	20	2	0
481	227	21	2	1
494	233	22	2	2
507	239	23	2	3
520	245	24	2	4
533	251	25	2	5
546	258	26	2	6
559	264	27	2	7
572	270	28	2	8
585	276	29	2	9
598	282	30	3	0
611	288	31	3	1
624	294	32	3	2
637	301	33	3	3
650	307	34	3	4
663	313	35	3	5
676	319	36	3	6
689	325	37	3	7
702	331	38	3	8
715	338	39	3	9
728	344	40	4	0
741	350	41	4	1
754	356	42	4	2
767	362	43	4	3
780	368	44	4	4
793	374	45	4	5
806	381	46	4	6
819	387	47	4	7
832	393	48	4	8
845	399	49	4	9
859	405	50	5	0
872	411	51	5	1
885	417	52	5	2
898	424	53	5	3
911	430	54	5	4
924	436	55	5	5
937	442	56	5	6
950	448	57	5	7
963	454	58	5	8
976	461	59	5	9
989	467	60	6	0
1002	473	61	6	1
1015	479	62	6	2
1028	485	63	6	3
1041	491	64	6	4
1054	497	65	6	5
1067	504	66	6	6
1080	510	67	6	7
1093	516	68	6	8
1106	522	69	6	9
1119	528	70	7	0
1132	534	71	7	1
1145	540	72	7	2
1158	547	73	7	3
1171	553	74	7	4
1184	559	75	7	5
1197	565	76	7	6
1210	571	77	7	7
1223	577	78	7	8
1236	584	79	7	9
1249	590	80	8	0
1262	596	81	8	1
1275	602	82	8	2
1288	608	83	8	3
1302	614	84	8	4
1315	620	85	8	5
1328	627	86	8	6
1341	633	87	8	7
1354	639	88	8	8
1367	645	89	8	9
1380	651	90	9	0
1393	657	91	9	1
1406	663	92	9	2
1419	670	93	9	3
1432	676	94	9	4
1445	682	95	9	5
1458	688	96	9	6
1471	694	97	9	7
1484	700	98	9	8
1497	706	99	9	9
1510	713	100	0	0

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Unit Setup

Chart 6 – VPxF 05SQ ECM CFM Table

VPxF 05SQ

Motor Min CFM: 280
Motor Max CFM: 1850

CFM	% L/sec	Setting	TENS Switch	UNITS Switch
280	132	1	0	1
296	140	2	0	2
312	147	3	0	3
327	155	4	0	4
343	162	5	0	5
359	170	6	0	6
375	177	7	0	7
391	184	8	0	8
407	192	9	0	9
423	199	10	1	0
438	207	11	1	1
454	214	12	1	2
470	222	13	1	3
486	229	14	1	4
502	237	15	1	5
518	244	16	1	6
534	252	17	1	7
549	259	18	1	8
565	267	19	1	9
581	274	20	2	0
597	282	21	2	1
613	289	22	2	2
629	297	23	2	3
645	304	24	2	4
661	312	25	2	5
676	319	26	2	6
692	327	27	2	7
708	334	28	2	8
724	342	29	2	9
740	349	30	3	0
756	357	31	3	1
772	364	32	3	2
787	372	33	3	3
803	379	34	3	4
819	387	35	3	5
835	394	36	3	6
851	402	37	3	7
867	409	38	3	8
883	417	39	3	9
898	424	40	4	0
914	431	41	4	1
930	439	42	4	2
946	446	43	4	3
962	454	44	4	4
978	461	45	4	5
994	469	46	4	6
1009	476	47	4	7
1025	484	48	4	8
1041	491	49	4	9
1057	499	50	5	0

CFM	L/Sec	% Setting	TENS Switch	UNITS Switch
1073	506	51	5	1
1089	514	52	5	2
1105	521	53	5	3
1120	529	54	5	4
1136	536	55	5	5
1152	544	56	5	6
1168	551	57	5	7
1184	559	58	5	8
1200	566	59	5	9
1216	574	60	6	0
1231	581	61	6	1
1247	589	62	6	2
1263	596	63	6	3
1279	604	64	6	4
1295	611	65	6	5
1311	619	66	6	6
1327	626	67	6	7
1342	634	68	6	8
1358	641	69	6	9
1374	649	70	7	0
1390	656	71	7	1
1406	664	72	7	2
1422	671	73	7	3
1438	678	74	7	4
1454	686	75	7	5
1469	693	76	7	6
1485	701	77	7	7
1501	708	78	7	8
1517	716	79	7	9
1533	723	80	8	0
1549	731	81	8	1
1565	738	82	8	2
1580	746	83	8	3
1596	753	84	8	4
1612	761	85	8	5
1628	768	86	8	6
1644	776	87	8	7
1660	783	88	8	8
1676	791	89	8	9
1691	798	90	9	0
1707	806	91	9	1
1723	813	92	9	2
1739	821	93	9	3
1755	828	94	9	4
1771	836	95	9	5
1787	843	96	9	6
1802	851	97	9	7
1818	858	98	9	8
1834	866	99	9	9
1850	873	100	0	0

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Unit Setup

Chart 7 – VPxF 06SQ ECM CFM Table

VPxF 06SQ

Motor Min CFM: 530
Motor Max CFM: 2100

CFM	% L/sec	TENS Setting	UNITS Switch	Switch
530	250	1	0	1
546	258	2	0	2
562	265	3	0	3
577	273	4	0	4
593	280	5	0	5
609	287	6	0	6
625	295	7	0	7
641	302	8	0	8
657	310	9	0	9
673	317	10	1	0
688	325	11	1	1
704	332	12	1	2
720	340	13	1	3
736	347	14	1	4
752	355	15	1	5
768	362	16	1	6
784	370	17	1	7
799	377	18	1	8
815	385	19	1	9
831	392	20	2	0
847	400	21	2	1
863	407	22	2	2
879	415	23	2	3
895	422	24	2	4
911	430	25	2	5
926	437	26	2	6
942	445	27	2	7
958	452	28	2	8
974	460	29	2	9
990	467	30	3	0
1006	475	31	3	1
1022	482	32	3	2
1037	490	33	3	3
1053	497	34	3	4
1069	505	35	3	5
1085	512	36	3	6
1101	520	37	3	7
1117	527	38	3	8
1133	535	39	3	9
1148	542	40	4	0
1164	549	41	4	1
1180	557	42	4	2
1196	564	43	4	3
1212	572	44	4	4
1228	579	45	4	5
1244	587	46	4	6
1259	594	47	4	7
1275	602	48	4	8
1291	609	49	4	9
1307	617	50	5	0

CFM	L/sec	% Setting	TENS Switch	`UNITS Switch
1323	624	51	5	1
1339	632	52	5	2
1355	639	53	5	3
1370	647	54	5	4
1386	654	55	5	5
1402	662	56	5	6
1418	669	57	5	7
1434	677	58	5	8
1450	684	59	5	9
1466	692	60	6	0
1481	699	61	6	1
1497	707	62	6	2
1513	714	63	6	3
1529	722	64	6	4
1545	729	65	6	5
1561	737	66	6	6
1577	744	67	6	7
1592	752	68	6	8
1608	759	69	6	9
1624	767	70	7	0
1640	774	71	7	1
1656	782	72	7	2
1672	789	73	7	3
1688	796	74	7	4
1704	804	75	7	5
1719	811	76	7	6
1735	819	77	7	7
1751	826	78	7	8
1767	834	79	7	9
1783	841	80	8	0
1799	849	81	8	1
1815	856	82	8	2
1830	864	83	8	3
1846	871	84	8	4
1862	879	85	8	5
1878	886	86	8	6
1894	894	87	8	7
1910	901	88	8	8
1926	909	89	8	9
1941	916	90	9	0
1957	924	91	9	1
1973	931	92	9	2
1989	939	93	9	3
2005	946	94	9	4
2021	954	95	9	5
2037	961	96	9	6
2052	969	97	9	7
2068	976	98	9	8
2084	984	99	9	9
2100	991	100	0	0

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Unit Setup

Chart 8 – VSxF 03SQ ECM CFM Table

VSxF 03SQ

Motor Min CFM: 200
Motor Max CFM: 1100

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
200	94	1	0	1
209	99	2	0	2
218	103	3	0	3
227	107	4	0	4
236	112	5	0	5
246	116	6	0	6
255	120	7	0	7
264	124	8	0	8
273	129	9	0	9
282	133	10	1	0
291	137	11	1	1
300	142	12	1	2
309	146	13	1	3
318	150	14	1	4
327	154	15	1	5
336	159	16	1	6
346	163	17	1	7
355	167	18	1	8
364	172	19	1	9
373	176	20	2	0
382	180	21	2	1
391	185	22	2	2
400	189	23	2	3
409	193	24	2	4
418	197	25	2	5
427	202	26	2	6
436	206	27	2	7
446	210	28	2	8
455	215	29	2	9
464	219	30	3	0
473	223	31	3	1
482	227	32	3	2
491	232	33	3	3
500	236	34	3	4
509	240	35	3	5
518	245	36	3	6
527	249	37	3	7
536	253	38	3	8
546	257	39	3	9
555	262	40	4	0
564	266	41	4	1
573	270	42	4	2
582	275	43	4	3
591	279	44	4	4
600	283	45	4	5
609	287	46	4	6
618	292	47	4	7
627	296	48	4	8
636	300	49	4	9
646	305	50	5	0

CFN	L/sec	% Setting	TENS Switch	UNITS Switch
655	309	51	5	1
664	313	52	5	2
673	318	53	5	3
682	322	54	5	4
691	326	55	5	5
700	330	56	5	6
709	335	57	5	7
718	339	58	5	8
727	343	59	5	9
736	348	60	6	0
745	352	61	6	1
755	356	62	6	2
764	360	63	6	3
773	365	64	6	4
782	369	65	6	5
791	373	66	6	6
800	378	67	6	7
809	382	68	6	8
818	386	69	6	9
827	390	70	7	0
836	395	71	7	1
845	399	72	7	2
855	403	73	7	3
864	408	74	7	4
873	412	75	7	5
882	416	76	7	6
891	420	77	7	7
900	425	78	7	8
909	429	79	7	9
918	433	80	8	0
927	438	81	8	1
936	442	82	8	2
945	446	83	8	3
955	451	84	8	4
964	455	85	8	5
973	459	86	8	6
982	463	87	8	7
991	468	88	8	8
1000	472	89	8	9
1009	476	90	9	0
1018	481	91	9	1
1027	485	92	9	2
1036	489	93	9	3
1045	493	94	9	4
1055	498	95	9	5
1064	502	96	9	6
1073	506	97	9	7
1082	511	98	9	8
1091	515	99	9	9
1100	519	100	0	0

Unit Setup

Chart 9– VSxF 04SQ ECM CFM Table

VSxF 04SQ

Motor Min CFM: 275
Motor Max CFM: 1500

CFM	% L/sec	TENS Setting	UNITS Switch	Switch
275	130	1	0	1
288	136	2	0	2
300	142	3	0	3
312	147	4	0	4
325	153	5	0	5
337	159	6	0	6
350	165	7	0	7
362	171	8	0	8
374	177	9	0	9
387	183	10	1	0
399	188	11	1	1
411	194	12	1	2
424	200	13	1	3
436	206	14	1	4
449	212	15	1	5
461	218	16	1	6
473	223	17	1	7
486	229	18	1	8
498	235	19	1	9
510	241	20	2	0
523	247	21	2	1
535	253	22	2	2
548	258	23	2	3
560	264	24	2	4
572	270	25	2	5
585	276	26	2	6
597	282	27	2	7
609	288	28	2	8
622	293	29	2	9
634	299	30	3	0
646	305	31	3	1
659	311	32	3	2
671	317	33	3	3
684	323	34	3	4
696	328	35	3	5
708	334	36	3	6
721	340	37	3	7
733	346	38	3	8
745	352	39	3	9
758	358	40	4	0
770	363	41	4	1
783	369	42	4	2
795	375	43	4	3
807	381	44	4	4
820	387	45	4	5
832	393	46	4	6
844	399	47	4	7
857	404	48	4	8
869	410	49	4	9
882	416	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
894	422	51	5	1
906	428	52	5	2
919	434	53	5	3
931	439	54	5	4
943	445	55	5	5
956	451	56	5	6
968	457	57	5	7
980	463	58	5	8
993	469	59	5	9
1005	474	60	6	0
1018	480	61	6	1
1030	486	62	6	2
1042	492	63	6	3
1055	498	64	6	4
1067	504	65	6	5
1079	509	66	6	6
1092	515	67	6	7
1104	521	68	6	8
1117	527	69	6	9
1129	533	70	7	0
1141	539	71	7	1
1154	544	72	7	2
1166	550	73	7	3
1178	556	74	7	4
1191	562	75	7	5
1203	568	76	7	6
1215	574	77	7	7
1228	579	78	7	8
1240	585	79	7	9
1253	591	80	8	0
1265	597	81	8	1
1277	603	82	8	2
1290	609	83	8	3
1302	615	84	8	4
1314	620	85	8	5
1327	626	86	8	6
1339	632	87	8	7
1352	638	88	8	8
1364	644	89	8	9
1376	650	90	9	0
1389	655	91	9	1
1401	661	92	9	2
1413	667	93	9	3
1426	673	94	9	4
1438	679	95	9	5
1451	685	96	9	6
1463	690	97	9	7
1475	696	98	9	8
1488	702	99	9	9
1500	708	100	0	0

TRANE®

Unit Setup

Chart 10– VSxF 05SQ ECM CFM Table

VSxF 05SQ

Motor Min CFM: 350
Motor Max CFM: 2050

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
350	165	1	0	1
367	173	2	0	2
385	181	3	0	3
402	190	4	0	4
419	198	5	0	5
436	206	6	0	6
453	214	7	0	7
470	222	8	0	8
488	230	9	0	9
505	238	10	1	0
522	246	11	1	1
539	254	12	1	2
556	263	13	1	3
573	271	14	1	4
591	279	15	1	5
608	287	16	1	6
625	295	17	1	7
642	303	18	1	8
659	311	19	1	9
676	319	20	2	0
694	327	21	2	1
711	335	22	2	2
728	344	23	2	3
745	352	24	2	4
762	360	25	2	5
779	368	26	2	6
797	376	27	2	7
814	384	28	2	8
831	392	29	2	9
848	400	30	3	0
865	408	31	3	1
882	416	32	3	2
900	425	33	3	3
917	433	34	3	4
934	441	35	3	5
951	449	36	3	6
968	457	37	3	7
985	465	38	3	8
1003	473	39	3	9
1020	481	40	4	0
1037	489	41	4	1
1054	498	42	4	2
1071	506	43	4	3
1088	514	44	4	4
1106	522	45	4	5
1123	530	46	4	6
1140	538	47	4	7
1157	546	48	4	8
1174	554	49	4	9
1192	562	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
1209	570	51	5	1
1226	579	52	5	2
1243	587	53	5	3
1260	595	54	5	4
1277	603	55	5	5
1295	611	56	5	6
1312	619	57	5	7
1329	627	58	5	8
1346	635	59	5	9
1363	643	60	6	0
1380	651	61	6	1
1398	660	62	6	2
1415	668	63	6	3
1432	676	64	6	4
1449	684	65	6	5
1466	692	66	6	6
1483	700	67	6	7
1501	708	68	6	8
1518	716	69	6	9
1535	724	70	7	0
1552	732	71	7	1
1569	741	72	7	2
1586	749	73	7	3
1604	757	74	7	4
1621	765	75	7	5
1638	773	76	7	6
1655	781	77	7	7
1672	789	78	7	8
1689	797	79	7	9
1707	805	80	8	0
1724	814	81	8	1
1741	822	82	8	2
1758	830	83	8	3
1775	838	84	8	4
1792	846	85	8	5
1810	854	86	8	6
1827	862	87	8	7
1844	870	88	8	8
1861	878	89	8	9
1878	886	90	9	0
1895	895	91	9	1
1913	903	92	9	2
1930	911	93	9	3
1947	919	94	9	4
1964	927	95	9	5
1981	935	96	9	6
1998	943	97	9	7
2016	951	98	9	8
2033	959	99	9	9
2050	967	100	0	0

Unit Setup

Chart 11–VSxF 06SQ ECM CFM Table

VSxF 06SQ

Motor Min CFM: 700
Motor Max CFM: 2500

CFM	% L/sec	TENS Setting	UNITS Switch	Switch
700	330	1	0	1
718	339	2	0	2
737	348	3	0	3
755	356	4	0	4
773	365	5	0	5
791	373	6	0	6
809	382	7	0	7
827	391	8	0	8
846	399	9	0	9
864	408	10	1	0
882	416	11	1	1
900	425	12	1	2
918	433	13	1	3
937	442	14	1	4
955	451	15	1	5
973	459	16	1	6
991	468	17	1	7
1009	476	18	1	8
1027	485	19	1	9
1046	493	20	2	0
1064	502	21	2	1
1082	511	22	2	2
1100	519	23	2	3
1118	528	24	2	4
1137	536	25	2	5
1155	545	26	2	6
1173	554	27	2	7
1191	562	28	2	8
1209	571	29	2	9
1227	579	30	3	0
1246	588	31	3	1
1264	596	32	3	2
1282	605	33	3	3
1300	614	34	3	4
1318	622	35	3	5
1336	631	36	3	6
1355	639	37	3	7
1373	648	38	3	8
1391	656	39	3	9
1409	665	40	4	0
1427	674	41	4	1
1446	682	42	4	2
1464	691	43	4	3
1482	699	44	4	4
1500	708	45	4	5
1518	717	46	4	6
1536	725	47	4	7
1555	734	48	4	8
1573	742	49	4	9
1591	751	50	5	0

CFM	% L/sec	TENS Setting	UNITS Switch	Switch
1609	759	51	5	1
1627	768	52	5	2
1646	777	53	5	3
1664	785	54	5	4
1682	794	55	5	5
1700	802	56	5	6
1718	811	57	5	7
1736	820	58	5	8
1755	828	59	5	9
1773	837	60	6	0
1791	845	61	6	1
1809	854	62	6	2
1827	862	63	6	3
1846	871	64	6	4
1864	880	65	6	5
1882	888	66	6	6
1900	897	67	6	7
1918	905	68	6	8
1936	914	69	6	9
1955	922	70	7	0
1973	931	71	7	1
1991	940	72	7	2
2009	948	73	7	3
2027	957	74	7	4
2046	965	75	7	5
2064	974	76	7	6
2082	983	77	7	7
2100	991	78	7	8
2118	1000	79	7	9
2136	1008	80	8	0
2155	1017	81	8	1
2173	1025	82	8	2
2191	1034	83	8	3
2209	1043	84	8	4
2227	1051	85	8	5
2245	1060	86	8	6
2264	1068	87	8	7
2282	1077	88	8	8
2300	1085	89	8	9
2318	1094	90	9	0
2336	1103	91	9	1
2355	1111	92	9	2
2373	1120	93	9	3
2391	1128	94	9	4
2409	1137	95	9	5
2427	1146	96	9	6
2445	1154	97	9	7
2464	1163	98	9	8
2482	1171	99	9	9
2500	1180	100	0	0

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Unit Setup

Chart 12– LPxF 08SQ ECM CFM Table

LPxF 08SQ

Motor Min CFM: 100
Motor Max CFM: 460

CFM	L/sec	% % Setting	TENS Switch	UNITS Switch
100	47	1	0	1
103	49	2	0	2
107	50	3	0	3
111	52	4	0	4
114	54	5	0	5
118	56	6	0	6
121	57	7	0	7
125	59	8	0	8
129	61	9	0	9
132	62	10	1	0
136	64	11	1	1
140	66	12	1	2
143	68	13	1	3
147	69	14	1	4
151	71	15	1	5
154	73	16	1	6
158	75	17	1	7
162	76	18	1	8
165	78	19	1	9
169	80	20	2	0
172	81	21	2	1
176	83	22	2	2
180	85	23	2	3
183	87	24	2	4
187	88	25	2	5
191	90	26	2	6
194	92	27	2	7
198	93	28	2	8
202	95	29	2	9
205	97	30	3	0
209	99	31	3	1
212	100	32	3	2
216	102	33	3	3
220	104	34	3	4
223	105	35	3	5
227	107	36	3	6
231	109	37	3	7
234	111	38	3	8
238	112	39	3	9
242	114	40	4	0
245	116	41	4	1
249	117	42	4	2
253	119	43	4	3
256	121	44	4	4
260	123	45	4	5
263	124	46	4	6
267	126	47	4	7
271	128	48	4	8
274	129	49	4	9
278	131	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
282	133	51	5	1
285	135	52	5	2
289	136	53	5	3
293	138	54	5	4
296	140	55	5	5
300	142	56	5	6
303	143	57	5	7
307	145	58	5	8
311	147	59	5	9
314	148	60	6	0
318	150	61	6	1
322	152	62	6	2
325	154	63	6	3
329	155	64	6	4
333	157	65	6	5
336	159	66	6	6
340	160	67	6	7
344	162	68	6	8
347	164	69	6	9
351	166	70	7	0
354	167	71	7	1
358	169	72	7	2
362	171	73	7	3
365	172	74	7	4
369	174	75	7	5
373	176	76	7	6
376	178	77	7	7
380	179	78	7	8
384	181	79	7	9
387	183	80	8	0
391	184	81	8	1
394	186	82	8	2
398	188	83	8	3
402	190	84	8	4
405	191	85	8	5
409	193	86	8	6
413	195	87	8	7
416	196	88	8	8
420	198	89	8	9
424	200	90	9	0
427	202	91	9	1
431	203	92	9	2
435	205	93	9	3
438	207	94	9	4
442	209	95	9	5
445	210	96	9	6
449	212	97	9	7
453	214	98	9	8
456	215	99	9	9
460	217	100	0	0

Unit Setup

Chart 13– LPxF 09SQ ECM CFM Table

LPxF 09SQ

Motor Min CFM: 250
Motor Max CFM: 1025

CFM	% L/sec	TENS Setting	UNITS Switch	Switch
250	118	1	0	1
258	122	2	0	2
265	125	3	0	3
273	129	4	0	4
281	133	5	0	5
289	136	6	0	6
297	140	7	0	7
305	144	8	0	8
312	147	9	0	9
320	151	10	1	0
328	155	11	1	1
336	159	12	1	2
344	162	13	1	3
352	166	14	1	4
359	170	15	1	5
367	173	16	1	6
375	177	17	1	7
383	181	18	1	8
391	184	19	1	9
399	188	20	2	0
406	192	21	2	1
414	196	22	2	2
422	199	23	2	3
430	203	24	2	4
438	207	25	2	5
446	210	26	2	6
453	214	27	2	7
461	218	28	2	8
469	221	29	2	9
477	225	30	3	0
485	229	31	3	1
493	232	32	3	2
500	236	33	3	3
508	240	34	3	4
516	244	35	3	5
524	247	36	3	6
532	251	37	3	7
540	255	38	3	8
547	258	39	3	9
555	262	40	4	0
563	266	41	4	1
571	269	42	4	2
579	273	43	4	3
587	277	44	4	4
594	281	45	4	5
602	284	46	4	6
610	288	47	4	7
618	292	48	4	8
626	295	49	4	9
634	299	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
641	303	51	5	1
649	306	52	5	2
657	310	53	5	3
665	314	54	5	4
673	317	55	5	5
680	321	56	5	6
688	325	57	5	7
696	329	58	5	8
704	332	59	5	9
712	336	60	6	0
720	340	61	6	1
727	343	62	6	2
735	347	63	6	3
743	351	64	6	4
751	354	65	6	5
759	358	66	6	6
767	362	67	6	7
774	365	68	6	8
782	369	69	6	9
790	373	70	7	0
798	377	71	7	1
806	380	72	7	2
814	384	73	7	3
821	388	74	7	4
829	391	75	7	5
837	395	76	7	6
845	399	77	7	7
853	402	78	7	8
861	406	79	7	9
868	410	80	8	0
876	414	81	8	1
884	417	82	8	2
892	421	83	8	3
900	425	84	8	4
908	428	85	8	5
915	432	86	8	6
923	436	87	8	7
931	439	88	8	8
939	443	89	8	9
947	447	90	9	0
955	450	91	9	1
962	454	92	9	2
970	458	93	9	3
978	462	94	9	4
986	465	95	9	5
994	469	96	9	6
1002	473	97	9	7
1009	476	98	9	8
1017	480	99	9	9
1025	484	100	0	0

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Unit Setup

Chart 14– LSxF 08SQ ECM CFM Table

LSxF 08SQ

Motor Min CFM: 100
Motor Max CFM: 460

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
100	47	1	0	1
103	49	2	0	2
107	50	3	0	3
111	52	4	0	4
114	54	5	0	5
118	56	6	0	6
121	57	7	0	7
125	59	8	0	8
129	61	9	0	9
132	62	10	1	0
136	64	11	1	1
140	66	12	1	2
143	68	13	1	3
147	69	14	1	4
151	71	15	1	5
154	73	16	1	6
158	75	17	1	7
162	76	18	1	8
165	78	19	1	9
169	80	20	2	0
172	81	21	2	1
176	83	22	2	2
180	85	23	2	3
183	87	24	2	4
187	88	25	2	5
191	90	26	2	6
194	92	27	2	7
198	93	28	2	8
202	95	29	2	9
205	97	30	3	0
209	99	31	3	1
212	100	32	3	2
216	102	33	3	3
220	104	34	3	4
223	105	35	3	5
227	107	36	3	6
231	109	37	3	7
234	111	38	3	8
238	112	39	3	9
242	114	40	4	0
245	116	41	4	1
249	117	42	4	2
253	119	43	4	3
256	121	44	4	4
260	123	45	4	5
263	124	46	4	6
267	126	47	4	7
271	128	48	4	8
274	129	49	4	9
278	131	50	5	0

CFM	L/sec	% Settings	TENS Switch	UNITS Switch
282	133	51	5	1
285	135	52	5	2
289	136	53	5	3
293	138	54	5	4
296	140	55	5	5
300	142	56	5	6
303	143	57	5	7
307	145	58	5	8
311	147	59	5	9
314	148	60	6	0
318	150	61	6	1
322	152	62	6	2
325	154	63	6	3
329	155	64	6	4
333	157	65	6	5
336	159	66	6	6
340	160	67	6	7
344	162	68	6	8
347	164	69	6	9
351	166	70	7	0
354	167	71	7	1
358	169	72	7	2
362	171	73	7	3
365	172	74	7	4
369	174	75	7	5
373	176	76	7	6
376	178	77	7	7
380	179	78	7	8
384	181	79	7	9
387	183	80	8	0
391	184	81	8	1
394	186	82	8	2
398	188	83	8	3
402	190	84	8	4
405	191	85	8	5
409	193	86	8	6
413	195	87	8	7
416	196	88	8	8
420	198	89	8	9
424	200	90	9	0
427	202	91	9	1
431	203	92	9	2
435	205	93	9	3
438	207	94	9	4
442	209	95	9	5
445	210	96	9	6
449	212	97	9	7
453	214	98	9	8
456	215	99	9	9
460	217	100	0	0

Unit Setup

Chart 15– LSxF 09SQ ECM CFM Table

LSxF 09SQ

Motor Min CFM: 240
Motor Max CFM: 950

CFM	% L/sec	TENS Setting	UNITS Switch	Switch
240	113	1	0	1
247	117	2	0	2
255	120	3	0	3
262	123	4	0	4
269	127	5	0	5
276	130	6	0	6
283	134	7	0	7
290	137	8	0	8
298	140	9	0	9
305	144	10	1	0
312	147	11	1	1
319	151	12	1	2
326	154	13	1	3
333	157	14	1	4
341	161	15	1	5
348	164	16	1	6
355	167	17	1	7
362	171	18	1	8
369	174	19	1	9
376	178	20	2	0
384	181	21	2	1
391	184	22	2	2
398	188	23	2	3
405	191	24	2	4
412	195	25	2	5
419	198	26	2	6
427	201	27	2	7
434	205	28	2	8
441	208	29	2	9
448	211	30	3	0
455	215	31	3	1
462	218	32	3	2
470	222	33	3	3
477	225	34	3	4
484	228	35	3	5
491	232	36	3	6
498	235	37	3	7
505	239	38	3	8
513	242	39	3	9
520	245	40	4	0
527	249	41	4	1
534	252	42	4	2
541	255	43	4	3
548	259	44	4	4
556	262	45	4	5
563	266	46	4	6
570	269	47	4	7
577	272	48	4	8
584	276	49	4	9
592	279	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
599	283	51	5	1
606	286	52	5	2
613	289	53	5	3
620	293	54	5	4
627	296	55	5	5
635	299	56	5	6
642	303	57	5	7
649	306	58	5	8
656	310	59	5	9
663	313	60	6	0
670	316	61	6	1
678	320	62	6	2
685	323	63	6	3
692	327	64	6	4
699	330	65	6	5
706	333	66	6	6
713	337	67	6	7
721	340	68	6	8
728	343	69	6	9
735	347	70	7	0
742	350	71	7	1
749	354	72	7	2
756	357	73	7	3
764	360	74	7	4
771	364	75	7	5
778	367	76	7	6
785	371	77	7	7
792	374	78	7	8
799	377	79	7	9
807	381	80	8	0
814	384	81	8	1
821	387	82	8	2
828	391	83	8	3
835	394	84	8	4
842	398	85	8	5
850	401	86	8	6
857	404	87	8	7
864	408	88	8	8
871	411	89	8	9
878	415	90	9	0
885	418	91	9	1
893	421	92	9	2
900	425	93	9	3
907	428	94	9	4
914	431	95	9	5
921	435	96	9	6
928	438	97	9	7
936	442	98	9	8
943	445	99	9	9
950	448	100	0	0

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Unit Setup

Chart 15– LSxF 10SQ ECM CFM Table

LSxF 10SQ

Motor Min CFM: 400
Motor Max CFM: 1800

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
400	189	1	0	1
414	196	2	0	2
428	202	3	0	3
443	209	4	0	4
457	216	5	0	5
471	222	6	0	6
485	229	7	0	7
499	236	8	0	8
513	242	9	0	9
527	249	10	1	0
542	256	11	1	1
556	262	12	1	2
570	269	13	1	3
584	276	14	1	4
598	282	15	1	5
612	289	16	1	6
626	296	17	1	7
641	302	18	1	8
655	309	19	1	9
669	316	20	2	0
683	322	21	2	1
697	329	22	2	2
711	336	23	2	3
725	342	24	2	4
740	349	25	2	5
754	356	26	2	6
768	362	27	2	7
782	369	28	2	8
796	376	29	2	9
810	382	30	3	0
824	389	31	3	1
838	396	32	3	2
853	402	33	3	3
867	409	34	3	4
881	416	35	3	5
895	422	36	3	6
909	429	37	3	7
923	436	38	3	8
937	442	39	3	9
952	449	40	4	0
966	456	41	4	1
980	462	42	4	2
994	469	43	4	3
1008	476	44	4	4
1022	482	45	4	5
1036	489	46	4	6
1051	496	47	4	7
1065	502	48	4	8
1079	509	49	4	9
1093	516	50	5	0

CFM	L/sec	% Setting	TENS Switch	UNITS Switch
1107	523	51	5	1
1121	529	52	5	2
1135	536	53	5	3
1150	543	54	5	4
1164	549	55	5	5
1178	556	56	5	6
1192	563	57	5	7
1206	569	58	5	8
1220	576	59	5	9
1234	583	60	6	0
1249	589	61	6	1
1263	596	62	6	2
1277	603	63	6	3
1291	609	64	6	4
1305	616	65	6	5
1319	623	66	6	6
1333	629	67	6	7
1348	636	68	6	8
1362	643	69	6	9
1376	649	70	7	0
1390	656	71	7	1
1404	663	72	7	2
1418	669	73	7	3
1432	676	74	7	4
1447	683	75	7	5
1461	689	76	7	6
1475	696	77	7	7
1489	703	78	7	8
1503	709	79	7	9
1517	716	80	8	0
1531	723	81	8	1
1545	729	82	8	2
1560	736	83	8	3
1574	743	84	8	4
1588	749	85	8	5
1602	756	86	8	6
1616	763	87	8	7
1630	769	88	8	8
1644	776	89	8	9
1659	783	90	9	0
1673	789	91	9	1
1687	796	92	9	2
1701	803	93	9	3
1715	809	94	9	4
1729	816	95	9	5
1743	823	96	9	6
1758	829	97	9	7
1772	836	98	9	8
1786	843	99	9	9
1800	850	100	0	0

Wiring Diagrams

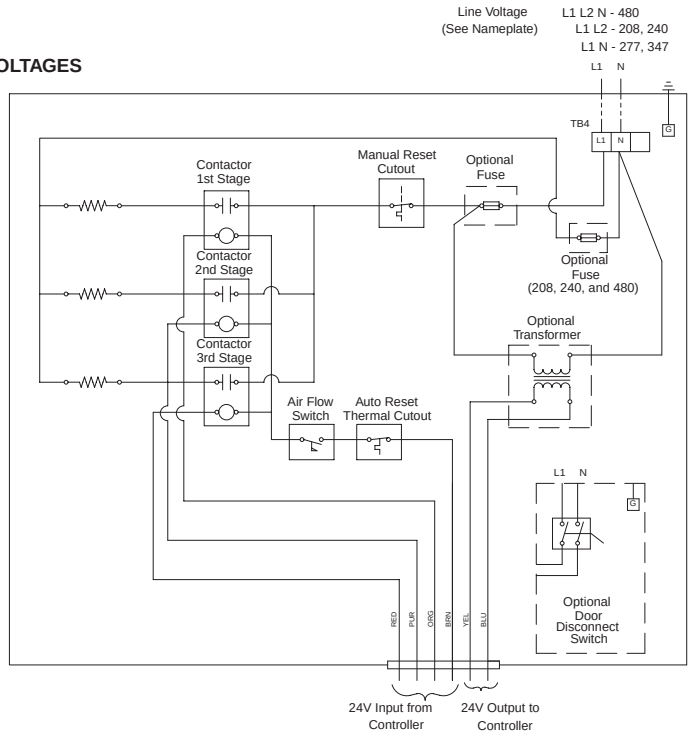
Figure 19 – Single-Duct Units (Electronic or DDC/UCM)

SINGLE DUCT UNITS - ELECTRONIC OR DDC/UCM -
HEATER TERMINALS - TYPICAL OF SINGLE PHASE VOLTAGES

SINGLE PHASE LINE VOLTAGES
208
240
277
347
480

STAGES
1
2
3

HEATER CONTACTORS
Magnetic Contactors (MAGN)
Mercury Contactors (MERC)

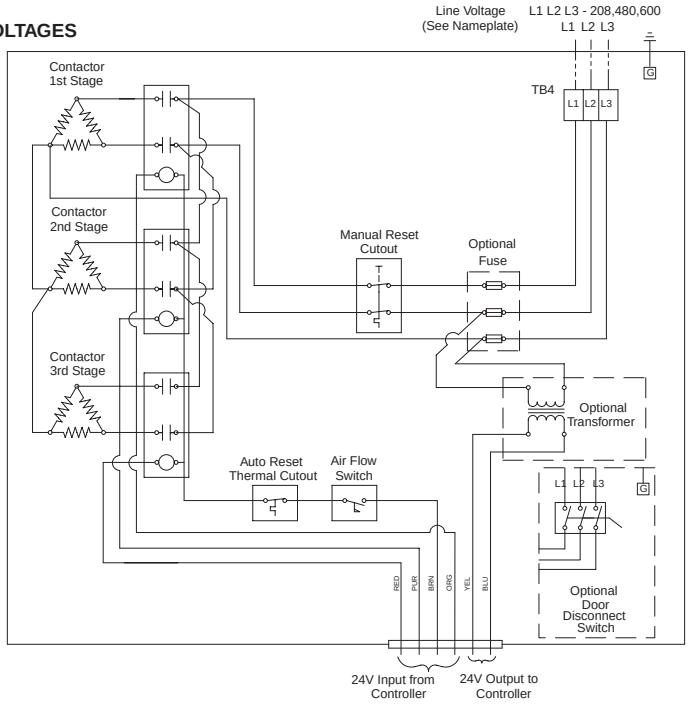


SINGLE DUCT UNITS - ELECTRONIC OR DDC/UCM -
HEATER TERMINALS - TYPICAL OF THREE PHASE VOLTAGES

THREE PHASE LINE VOLTAGES
208
480
575

STAGES
1
2
3

HEATER CONTACTORS
Magnetic Contactors (MAGN)
Mercury Contactors (MERC)



Notes:

1. FACTORY INSTALLED
   FIELD INSTALLED
   OPTIONAL
2. Actual heater wiring diagrams are supplied with each unit (3-stage shown).
3. Load carrying P.E. Switches or Contactors are supplied depending upon amp drawn.
4. Air Flow Switch, Auto Reset Thermal Cutout and Manual Reset Cutout are provided as standard.
5. Heater Line Fuses, Transformers, and Door Interlocking Disconnect are optional.
6. If transformer is not ordered, a separate 24-volt power supply is required for operation of unit controls.

Wiring Diagrams

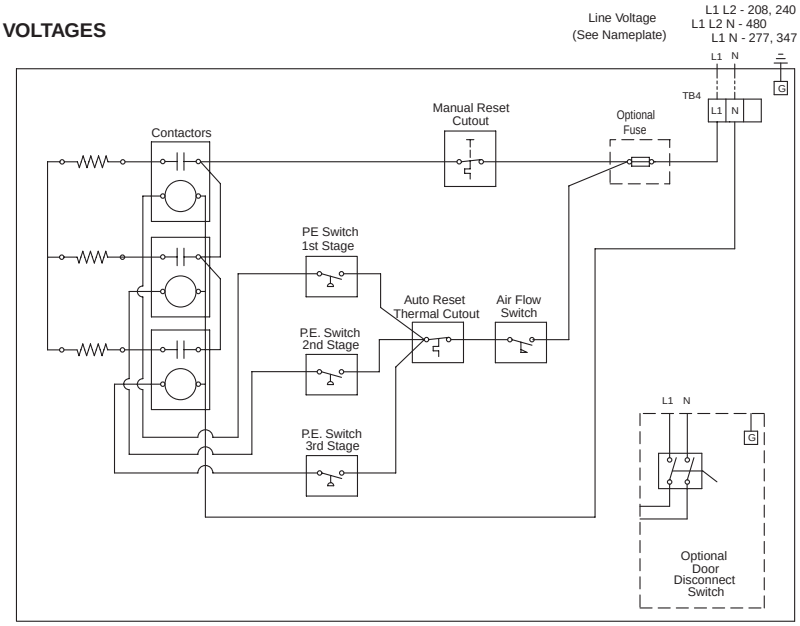
Figure 20 – Single-Duct Units (Pneumatic Controls)

**SINGLE DUCT UNITS - PNEUMATIC CONTROL -
HEATER TERMINAL - TYPICAL OF SINGLE PHASE VOLTAGES**

SINGLE PHASE LINE VOLTAGES
208
240
277
347
480

STAGES
1
2
3

HEATER CONTACTORS
P.E. with Magnetic Contactors (PEMA)
P.E. with Mercury Contactors (PEME)

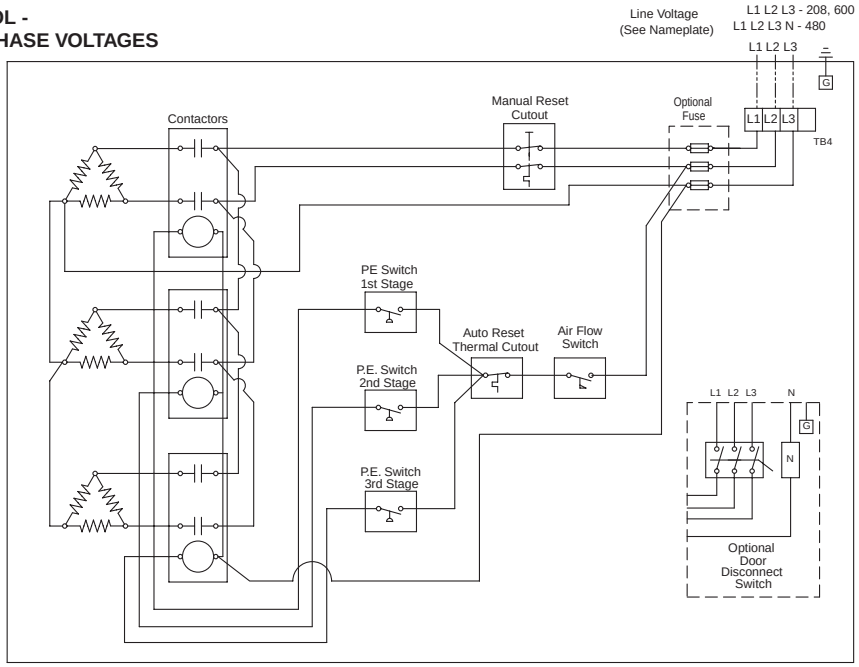


**SINGLE DUCT UNITS - PNEUMATIC CONTROL -
HEATER TERMINAL - TYPICAL OF THREE PHASE VOLTAGES**

THREE PHASE LINE VOLTAGES
208
480
575

STAGES
1
2
3

HEATER CONTACTORS
P.E. with Magnetic Contactors (PEMA)
P.E. with Mercury Contactors (PEME)



NOTE:

1. ——————— FACTORY INSTALLED
   —·—·—·—·—·— FIELD INSTALLED
   — — — — OPTIONAL
2. Actual heater wiring diagram is supplied with each unit (3-stage shown).
3. Load carrying P.E. Switches or Contactors are supplied depending upon amp drawn.
4. Air Flow Switch, Auto Reset Thermal Cutout and Manual Reset Cutout provided as standard.
5. Heater Line Fuses and Door Interlocking Disconnect are optional.

Wiring Diagrams

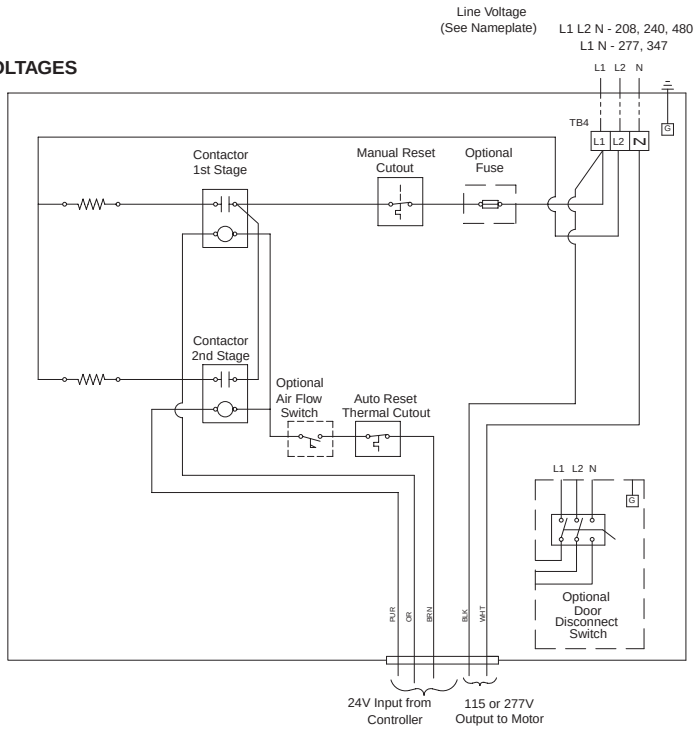
Figure 21 – Fan-Powered Units (Electronic or DDC/UCM)

FAN-POWERED UNITS - ELECTRONIC OR DDC/UCM -
HEATER TERMINALS - TYPICAL OF SINGLE PHASE VOLTAGES

SINGLE PHASE LINE VOLTAGES
208
240
277
347
480

STAGES
1
2

HEATER CONTACTORS
Magnetic Contactors (MAGN)
Mercury Contactors (MERC)

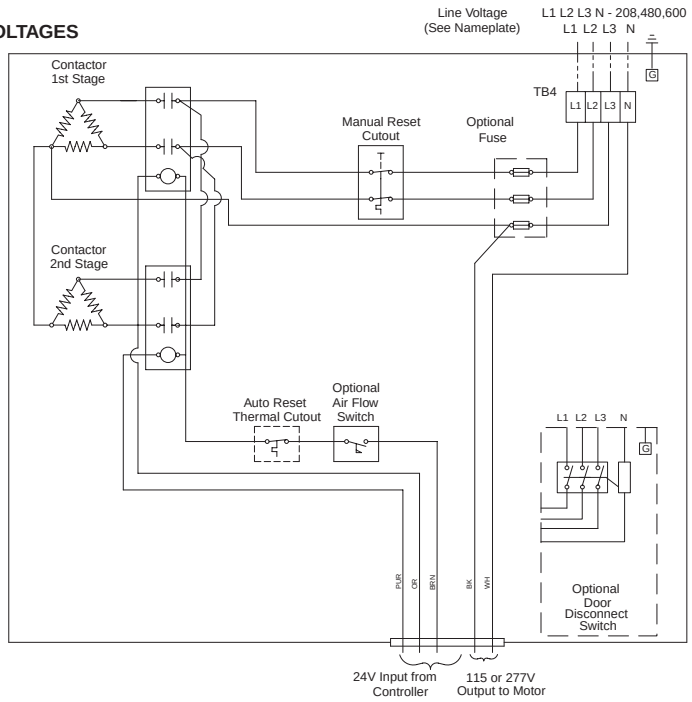


FAN-POWERED UNITS - ELECTRONIC OR DDC/UCM -
HEATER TERMINALS - TYPICAL OF THREE PHASE VOLTAGES

THREE PHASE LINE VOLTAGES
208
480
575

STAGES
1
2

HEATER CONTACTORS
Magnetic Contactors (MAGN)
Mercury Contactors (MERC)



Notes:

1. FACTORY INSTALLED
   FIELD INSTALLED
   OPTIONAL
2. Actual heater wiring diagrams are supplied with each unit (2-stage shown).
3. Load carrying P.E. Switches or Contactors are supplied depending upon amp drawn.
4. Auto Reset Thermal Cutout and Manual Reset Cutout are provided as standard.
5. Heater Line Fuses, Airflow Switch, and Door Interlocking Disconnect are optional.

TRANE®

Wiring Diagrams

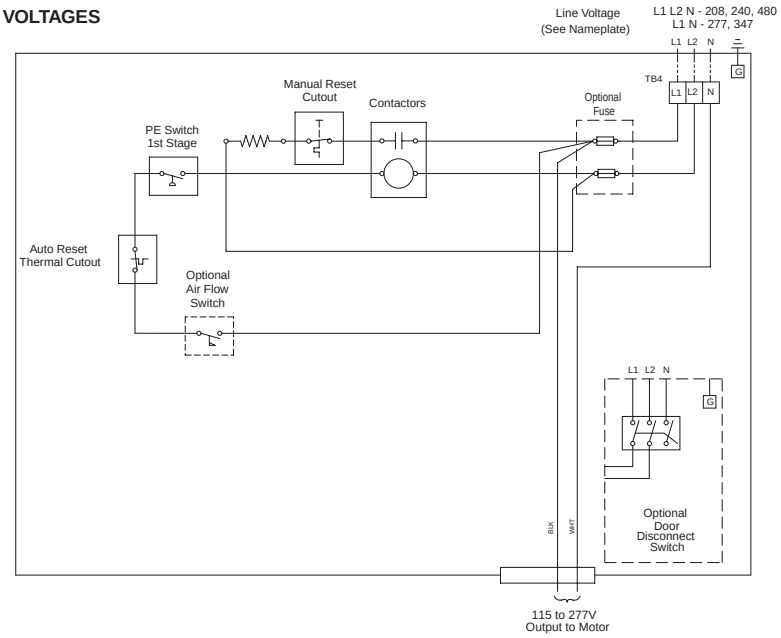
Figure 22 – Fan-Powered Units (Pneumatic Controls)

FAN-POWERED UNITS - PNEUMATIC CONTROL -
HEATER TERMINAL - TYPICAL OF SINGLE PHASE VOLTAGES

SINGLE PHASE LINE VOLTAGES
208
240
277
347
480

STAGES
1
2
3

HEATER CONTACTORS
P.E. with Magnetic Contactors (PEMA)
P.E. with Mercury Contactors (PEME)

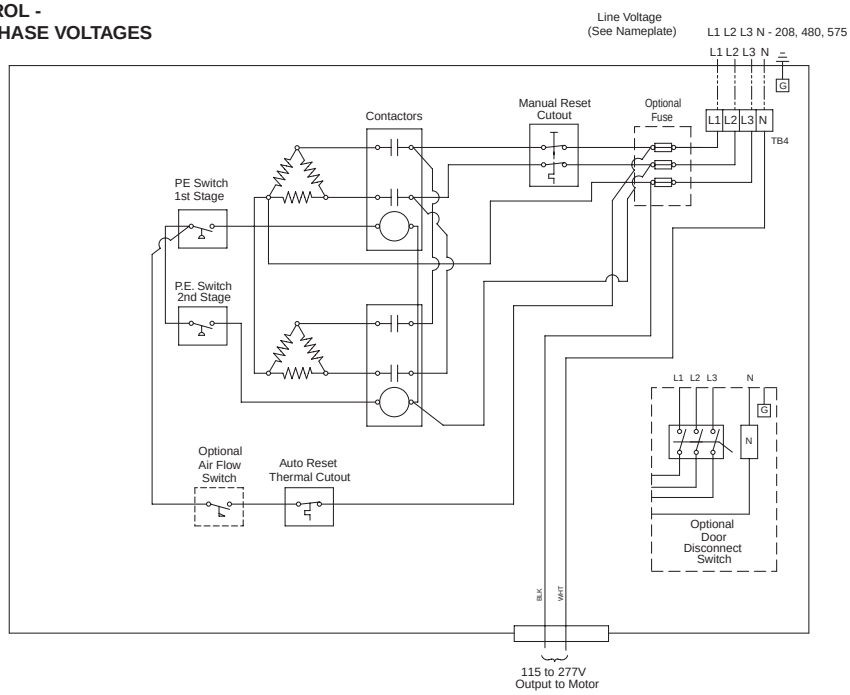


FAN-POWERED UNITS - PNEUMATIC CONTROL -
HEATER TERMINAL - TYPICAL OF THREE PHASE VOLTAGES

THREE PHASE LINE VOLTAGES
208
480
575

STAGES
1
2
3

HEATER CONTACTORS
P.E. with Magnetic Contactors (PEMA)
P.E. with Mercury Contactors (PEME)

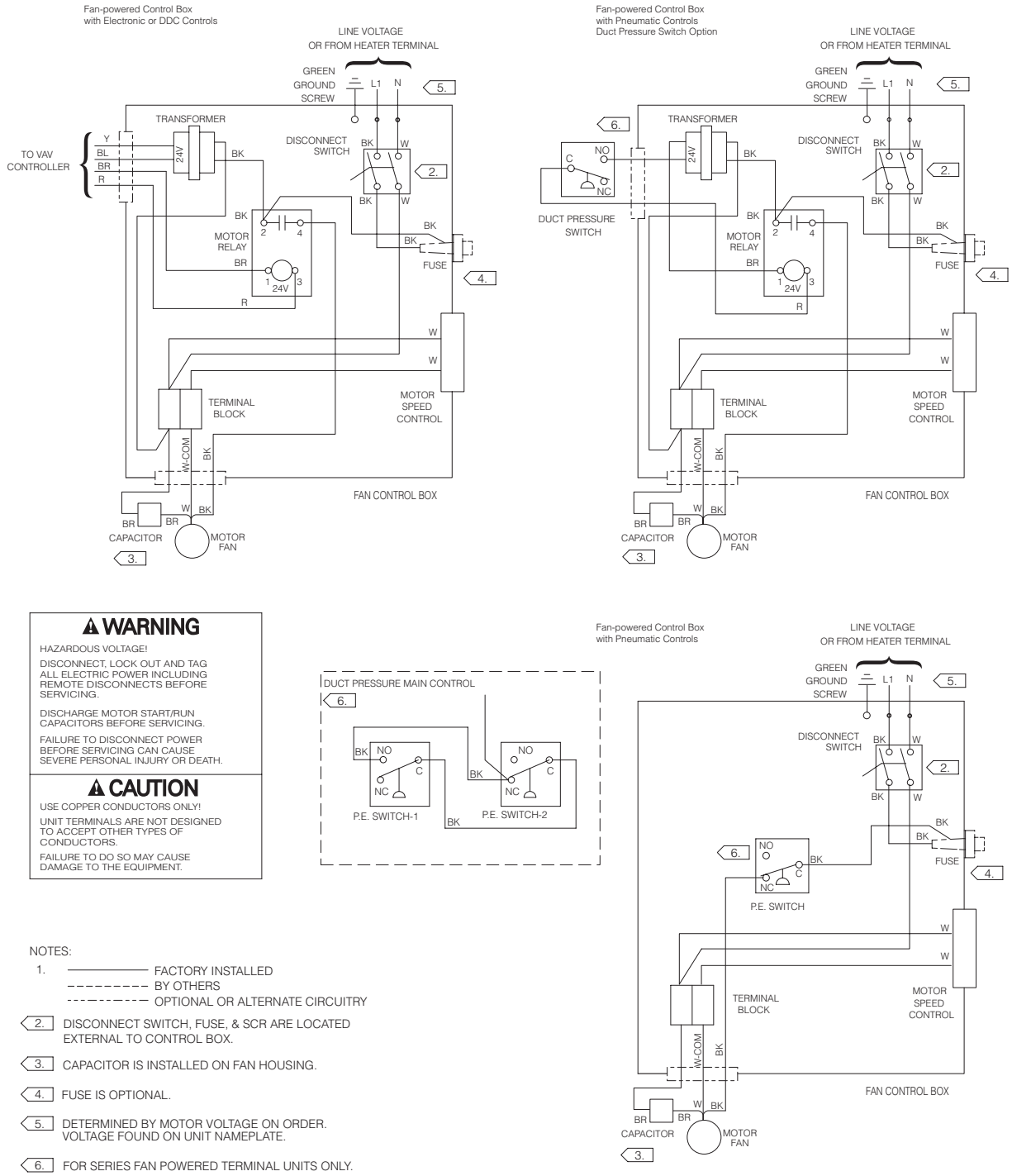


NOTE:

1. ——————— FACTORY INSTALLED
   —·—·—·—·—·— FIELD INSTALLED
   — — — — OPTIONAL
2. Actual heater wiring diagram is supplied with each unit (1 and 2-stage shown).
3. Load carrying P.E. Switches or Contactors are supplied depending upon amp drawn.
4. Auto Reset Thermal Cutout and Manual Reset Cutout provided as standard.
5. Heater Line Fuses, Door Interlocking Disconnect, and Airflow Switch are optional.

Wiring Diagrams

Figure 23 – Fan-Powered Control Boxes



NOTES:

1. ———— FACTORY INSTALLED
   – – – – – – – – – BY OTHERS
   – – – – – – – – – – OPTIONAL OR ALTERNATE CIRCUITRY

2. DISCONNECT SWITCH, FUSE, & SCR ARE LOCATED EXTERNAL TO CONTROL BOX.

3. CAPACITOR IS INSTALLED ON FAN HOUSING.

4. FUSE IS OPTIONAL.

5. DETERMINED BY MOTOR VOLTAGE ON ORDER. VOLTAGE FOUND ON UNIT NAMEPLATE.

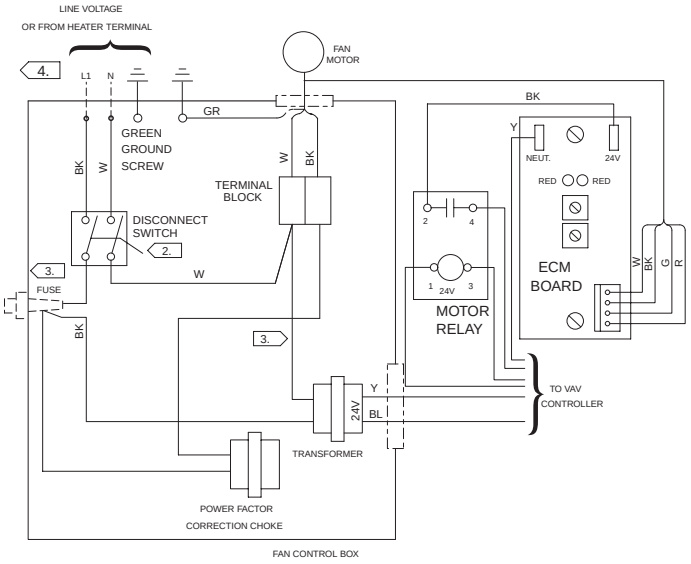
6. FOR SERIES FAN POWERED TERMINAL UNITS ONLY.

TRANE®

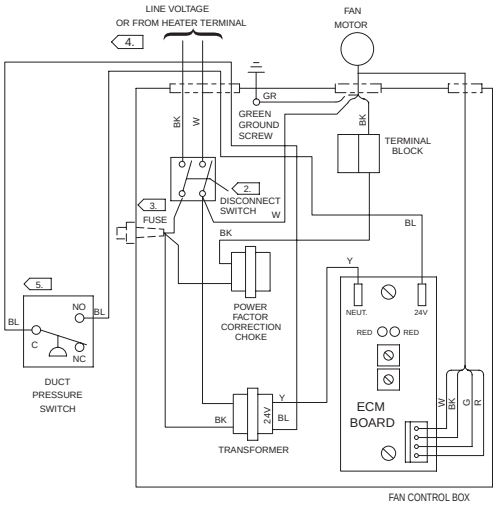
Wiring Diagrams

Figure 24 – Fan-Powered Units with ECM

Fan-powered Control Box w/ ECM with Electronic or DDC Controls
(Depending on the size of the unit, the ECM board may or may not be located in the fan control box.)



Fan-powered Control Box w/ ECM with Pneumatic Controls
Duct Pressure Switch Option



⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT, LOCK OUT AND TAG ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

DISCHARGE MOTOR START/RUN CAPACITORS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

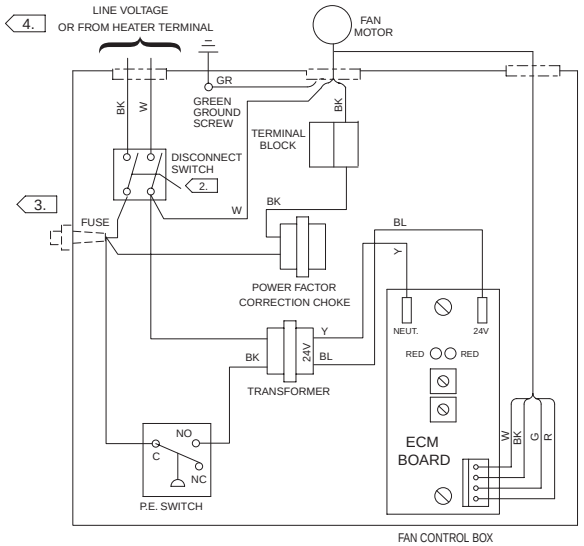
⚠ CAUTION

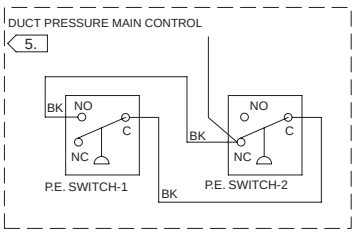
USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

Fan-powered Control Box with Pneumatic Controls





NOTES:

1. ———— FACTORY INSTALLED
   – – – – – – – – – BY OTHERS
   – – – – – – – – – OPTIONAL OR ALTERNATE CIRCUITRY

2. DISCONNECT SWITCH, FUSE, & SCR ARE LOCATED EXTERNAL TO CONTROL BOX.

3. FUSE IS OPTIONAL.

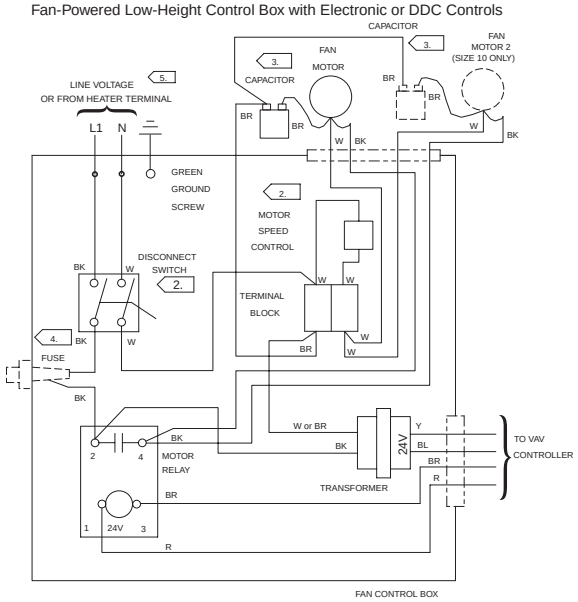
4. DETERMINED BY MOTOR VOLTAGE ON ORDER. VOLTAGE FOUND ON UNIT NAMEPLATE.

5. FOR SERIES FAN POWERED TERMINAL UNITS ONLY.

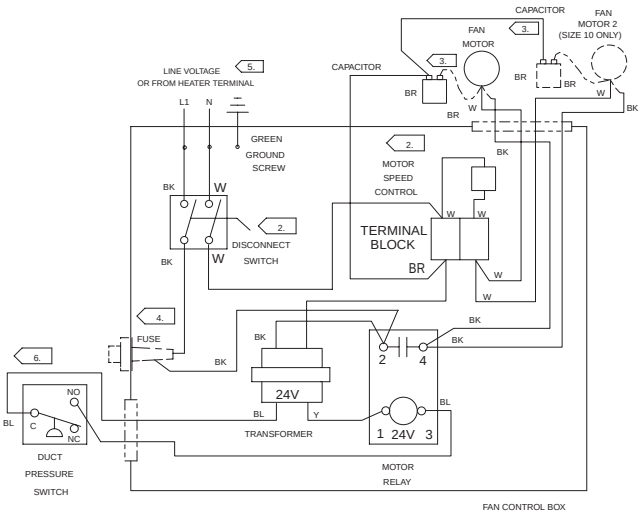
Wiring Diagrams

Figure 25 – Fan-Powered Low-Height Units

Fan-Powered Low-Height Control Box with Electronic or DDC Controls



Fan-Powered Low-Height Control Box with Pneumatic Controls
Duct Pressure Switch Option



⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT, LOCK OUT AND TAG ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

DISCHARGE MOTOR START/RUN CAPACITORS BEFORE SERVICING.

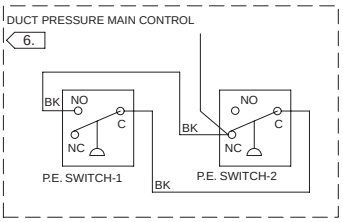
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ CAUTION

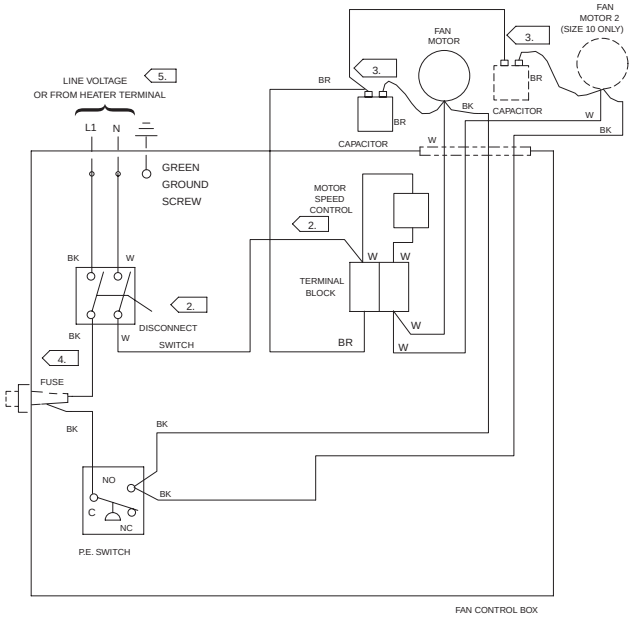
USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.



Fan-Powered Low-Height Control Box with Pneumatic Controls



NOTES:

1. ———— FACTORY INSTALLED
   - - - - - - - - - BY OTHERS
   ---·--·--- OPTIONAL OR ALTERNATE CIRCUITRY

2. DISCONNECT SWITCH, FUSE, & SCR ARE LOCATED EXTERNAL TO CONTROL BOX.

3. CAPACITOR IS INSTALLED ON FAN HOUSING.

4. FUSE IS OPTIONAL.

5. DETERMINED BY MOTOR VOLTAGE ON ORDER. VOLTAGE FOUND ON UNIT NAMEPLATE.

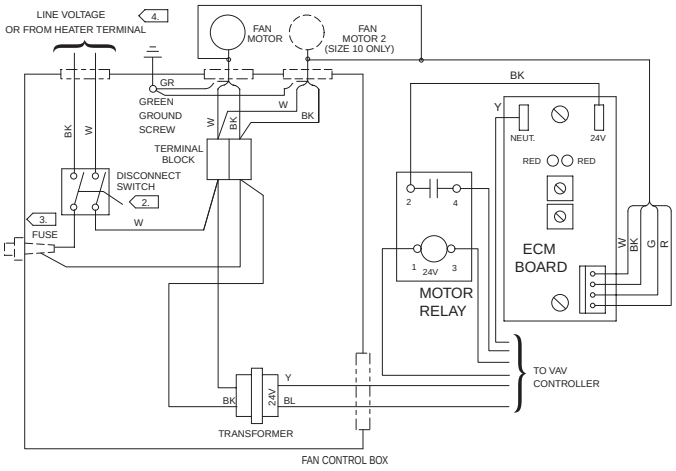
6. FOR SERIES FAN POWERED TERMINAL UNITS ONLY.

TRANE®

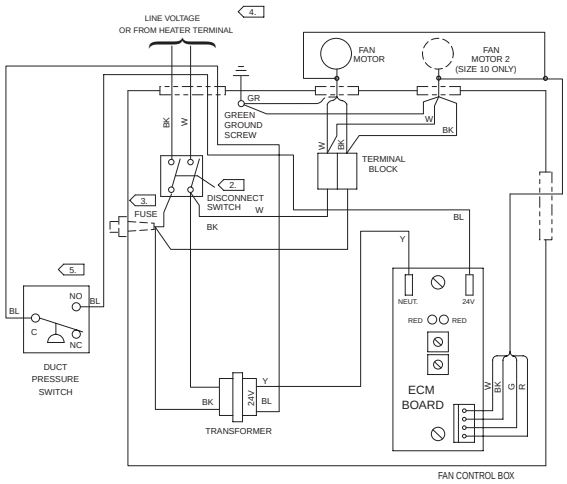
Wiring Diagrams

Figure 26 – Fan-Powered Low-Height Units with ECM

Fan-Powered Low-Height Control Box w/ ECM with Electronic or DDC Controls
(Depending on the size of the unit, the ECM board may or may not be located in the fan control box.)



Fan-Powered Low-Height Control Box w/ ECM with Pneumatic Controls
Duct Pressure Switch Option



⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT, LOCK OUT AND TAG ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

DISCHARGE MOTOR START/RUN CAPACITORS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

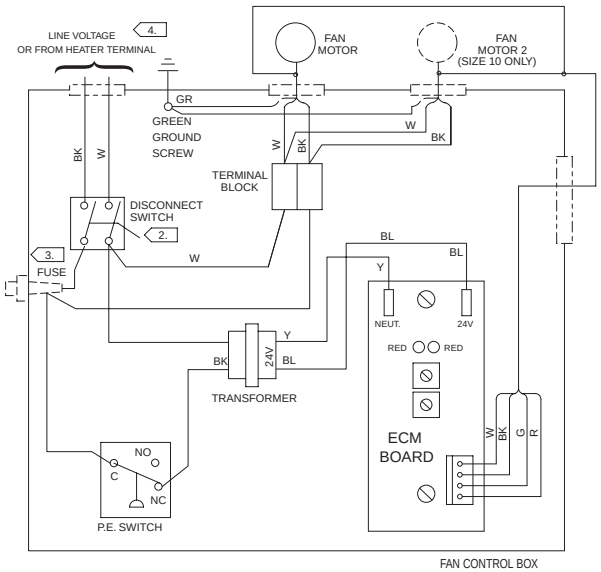
⚠ CAUTION

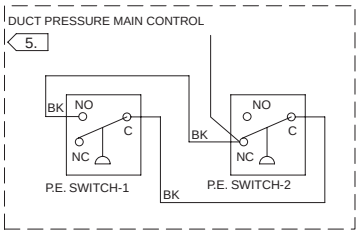
USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

Fan-Powered Low-Height Control Box w/ ECM with Pneumatic Controls





NOTES:

1. ——— FACTORY INSTALLED
   - - - - - - - - - BY OTHERS
   - - - - - - - - - - OPTIONAL OR ALTERNATE CIRCUITRY

2. DISCONNECT SWITCH, FUSE, & SCR ARE LOCATED EXTERNAL TO CONTROL BOX.

3. FUSE IS OPTIONAL.

4. DETERMINED BY MOTOR VOLTAGE ON ORDER. VOLTAGE FOUND ON UNIT NAMEPLATE.

5. FOR SERIES FAN POWERED TERMINAL UNITS ONLY.

Maintenance

Periodic maintenance of the VariTrane product is minimal, but necessary for efficient operation. Routine maintenance consists of inspecting/replacing the air filters of the fan-powered terminals.

Motors

Both the PSC (permanent split capacitor) and the ECM (Electrically Commutated Motor) require no lubrication during its normal life of operation.

Fan Wheel:

Periodically, the fan wheel should be inspected for dirt or debris and cleaned as necessary.

Filter

The filter on fan-powered terminals will need to be inspected/replaced routinely depending on the environmental conditions of the plenum.

Water Coil

Water coils should be inspected and the fins should be cleaned periodically.

Water coils have been provided with an access panel as standard to assist with inspection and cleaning.

Fan Motor Replacement

⚠ WARNING

Hazardous Voltage w/Capacitors!

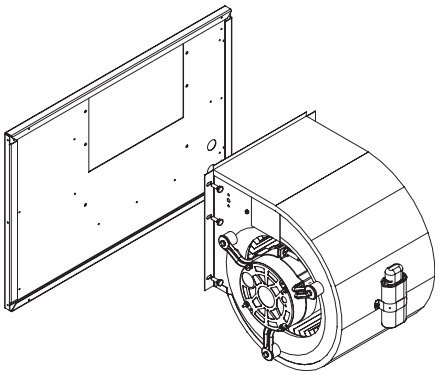
Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

⚠ WARNING

Rotating Components!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

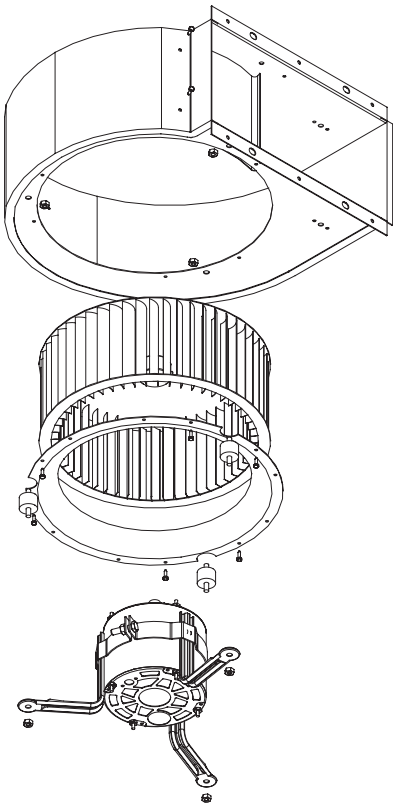
Figure 27 – Standard Motor Removal



Standard height fan-powered series and parallel fan motors are replaceable through the filter opening and the standard sliding side access panel. To access the fan motor, the fan housing must be detached by removing the mounting bolts that hold the housing to the fan board. Removing the entire housing allows the fan motor, fan housing, and fan wheel to be re-aligned on a workbench or floor and prevent any possible fan wheel rubbing that may occur. Removing the housing will provide access to the motor shaft set screw that holds the fan wheel to the motor shaft.

The low-height fan assembly was designed with an inlet ring that assists with removal of the fan motor. To access the fan motor assembly, the bottom panel must be removed. The inlet ring is held in place by six bolts and three motor mount bolts. Remove these bolts and the motor and fan wheel will come out of the fan housing.

Figure 28 – Low-Height Motor Removal



TRANE®

Installation of Diffusers

General

All units must be installed upright and level as indicated by the arrow on the side of the units. Return air slots should be placed perpendicular and offset to the slot diffusers to avoid short-circuiting of air distribution patterns.

Place the unit in its approximate final position and check that it is upright and level. For **single- slot units**, engage the back of the diffuser over the t-bar with an edge and both ends resting on the t-bar. For **double-slot units**, slide the unit over the t-bar. For **center-notch units**, place diffuser over the t-bar, straddling it across a t-bar and resting on the units ends.

If the unit has a fire damper, make sure that the damper is still fully open. Diffuser discharge must always be flush with the ceiling tiles to assure the proper airflow (Coanda effect).

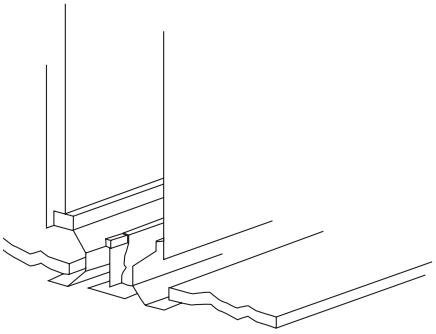
Diffusers require specific installation information when mounting to a desired ceiling type. Select the ceiling type that closely matches the job site application and use the following procedures.

T-Bar Ceiling

Finish installation of the diffuser in t-bar ceiling. (See Figure 29.) Follow these procedures before the ceiling construction is completed.

1. Position the diffuser at each end resting directly on the structural t-bar for support and the t-bar fitting into the channel provided at the unit discharge air throw.
2. A ceiling tile support flange is provided on each side of the discharge slot of the unit. Trim ceiling tile approximately 1½ inches each to allow for width of discharge slot. For revealed edge ceilings, tile must be cut in a "Z" pattern.
3. Install ceiling tiles in usual manner with cut edges resting on the flanges of the air slot.

Figure 29 – Diffuser Installation in T-Bar Ceiling



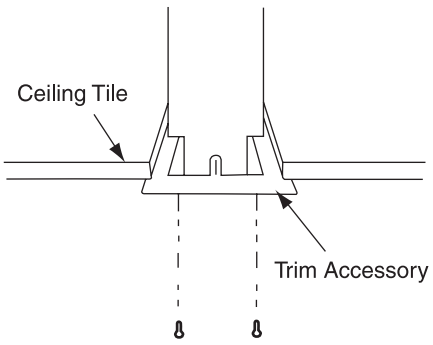
Concealed Spline Ceiling

Follow these procedures to finish installation of control and satellite diffusers and concealed spline for suspension ceilings before completing the ceiling construction (Figure 30).

Place the units in their approximate final positions. If using the trim angle diffuser, its slots must be even with the spline level. If applying the trim accessory, the bottom of the diffuser must be level with the finished ceiling.

If installing the trim accessory, insert the trim into the ceiling opening from below and engage the diffuser slot to the trim t-bar structure. With bottom flange of trim accessory against the ceiling, and using the pre-drilled holes in the flange as a guide, drill holes in the flange of the diffuser. Join the diffuser and trim accessory with self-taping sheet metal.

Figure 30 – Diffuser with Trim Accessory Installation in Concealed Spline Ceiling



Drywall/Plaster Ceiling

Finish installation of diffusers in plaster ceiling. Follow these procedures before completing the ceiling construction (Figure 31).

1. Suspend the units above the intended ceiling level and their approximate horizontal positions and finish running flexible ductwork.
2. After drywall and/or plaster is installed, cut openings to receive the diffuser air outlets. Also, allow for access openings to complete installation and service of the unit.
3. Slide the trim accessory up and into the ceiling opening. Using the rim accessory as a template, drill four guide holes in the lip of the diffuser slot. Lower the unit onto the trim frame and attach with the sheet metal screws.

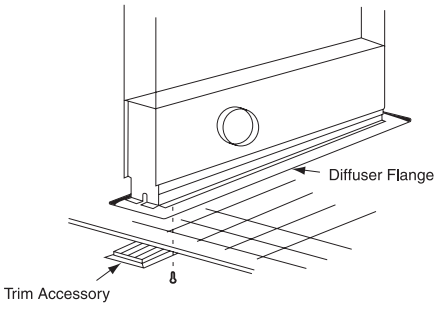
Note: The bottom of the throat section must be parallel to the ceilings for proper air distribution.

⚠ CAUTION

Equipment Damage!

Do not install trim frame into ceiling using screws. When diffuser is placed on the trim frames, it will pull out.

Figure 31 – Diffuser with Trim Accessory Installation in Plaster Ceiling



Plaster trim frame attaches with 2–4 tension clips on the side of the diffuser.

Maintenance/ Service Log

Date	Tag	Serial #	Service Notes

TRANE®

Maintenance/ Service Log

Date	Tag	Serial #	Service Notes

Notes

TRANE®

Trane
An American Standard Company
www.trane.com

For more information contact your local district office or e-mail us at comfort@trane.com

Literature Order Number	VAV-SVN01E-EN
File Number	SL-TD-000-VAV-SVN01E-EN-0606
Supersedes	SL-TD-000-VAV-SVN01D-EN-0905
Stocking Location	Inland

Technical Specifications

Exhibit 3 - Submittals

Submittal

Prepared For:
B&I Contractors

Date: February 14, 2022

Job Name:
Ft Lauderdale Fire Station 54

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	Trane - Mitsubishi Ductless Split (P Series) (JV_P)

Andrew Miller
Trane U.S. Inc.
2884 Corporate Way
Miramar, FL 33025
Office Phone: (954) 499-6900

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Please Note:

- Contractor to review submittal for accuracy prior to equipment release

TPLA0A0361EA70A & TRUZA0361KA70(N/B)A
36,000 BTU/H 3' X 3' CEILING CASSETTE
36,000 BTU/H HEAT PUMP UNIVERSAL OUTDOOR

Job Name: **Ft Lauderdale Fire Station 54**
System Reference: **AHU/CU-2** Date: **2-14-22**

Indoor Unit TPLA0A0361EA70A

Outdoor Unit
- ☑ Standard Model TRUZA0361KA70NA
- ☐ Seacoast Model TRUZA0361KA70BA

INDOOR UNIT FEATURES
- Space-efficient ductless installation
- Equipped with 3D i-see Sensor® for enhanced comfort and energy efficiency
- Airflow settings for high and low ceiling applications
- Individual vane settings for direct/indirect airflow control or variable airflow patterns
- Knockouts for outside-air intake and branch-duct run
- Filter indicator signal
- Easy-to-clean, washable filter (optional high-efficiency filter available - requires multi-function casement)
- Built-in condensate lift mechanism
- Ideal for retail shops, classrooms, office spaces, conference centers, building lobbies, and more
- Multiple control options available:
  - kumo cloud® smart device app for remote access
  - Third-party interface options
  - Wired or wireless controllers

OUTDOOR UNIT FEATURES
- Variable speed INVERTER-driven compressor
- Power receiver pre-charged with refrigerant volume for piping length up to 100 ft
- Low ambient cooling down to 0°F providing 100% capacity
- 24-hour continuous operation (cooling mode)
- High pressure protection
- Fast restart
- Superior energy and operational efficiency

SPECIFICATIONS: TPLA0A0361EA70A & TRUZA0361KA70(N/B)A

Cooling at 95°F[1]	Maximum Capacity	BTU/H	36,000
	Rated Capacity	BTU/H	36,000
	Minimum Capacity	BTU/H	16,000
	Maximum Power Input	W	2,780
	Rated Power Input	W	2,780
	Moisture Removal	Pints/h	4.5
	Sensible Heat Factor		0.86
	Power Factor	%	93.7/93.7
Heating at 47°F[2]	Maximum Capacity	BTU/H	42,000
	Rated Capacity	BTU/H	38,000
	Minimum Capacity	BTU/H	18,000
	Maximum Power Input	W	3,020
	Rated Power Input	W	2,540
	Power Factor	%	93.6/93.6
Heating at 17°F[3]	Maximum Capacity	BTU/H	25,500
	Rated Capacity	BTU/H	22,000
	Maximum Power Input	W	2,550
	Rated Power Input	W	2,490
Heating at 5°F[4]	Maximum Capacity	BTU/H	21,600
	Maximum Power Input	W	2,600
Efficiency	SEER		21.8
	EER[1]		12.9
	HSPF [IV]		10.4
	COP at 47°F[2]		4.38
	COP at 17°F at Maximum Capacity[3]		2.94
	COP at 5°F at Maximum Capacity[4]		2.43
	ENERGY STAR® Certified		Yes
Electrical	Voltage, Phase, Frequency		208/230, 1, 60
	Guaranteed Voltage Range	V AC	198 - 253
	Voltage: Indoor - Outdoor, S1-S2	V AC	208/230
	Voltage: Indoor - Outdoor, S2-S3	V DC	24
	Short-circuit Current Rating [SCCR]	kA	5
	Recommended Fuse/Breaker Size (Oudoor)	A	30
	Recommended Wire Size [Indoor - Outdoor]	AWG	14
	Power Supply		Indoor unit is powered by the outdoor unit
Indoor Unit	MCA	A	2.0
	Fan Motor Full Load Amperage	A	0.95
	Fan Motor Output	W	120
	Fan Motor Type		DC Motor
	Airflow Rate at Cooling, Dry	CFM	670–850–1020–1200
	Airflow Rate at Cooling, Wet	CFM	630–810–980–1160
	Airflow Rate at Heating, Dry	CFM	670–850–1020–1200
	Sound Pressure Level [Cooling]	dB[A]	32–37–41–44
	Sound Pressure Level [Heating]	dB[A]	32–37–41–44
	Drain Pipe Size	In. [mm]	1-1/4 [32]
	Condensate Lift Mechanism, Maximum Distance	In. [mm]	33-7/16 [849]
	Coating on Heat Exchanger		—
	External Finish Color		White Munsell 6.4Y 8.9/0.4
	Unit Dimensions	W x D x H: In. [mm]	33-1/16 // 37-13/32 x 33-1/16 // 37-13/32 x 11-3/4 // 1-9/16 [840 // 950 x 840 // 950 x 298 // 40]
	Package Dimensions	W x D x H: In. [mm]	35-9/16 // 39-6/16 x 34-5/16 // 38-3/16 x 16-9/16 // 4-12/16 [903 // 1000 x 871 // 970 x 421 // 121]
	Unit Weight	Lbs. [kg]	56 // 11 [25 // 5]
	Package Weight	Lbs. [kg]	77 [35]
Indoor Unit Operating Temperature Range	Cooling Intake Air Temp [Maximum / Minimum]*	°F	90 DB, 72 WB / 66 DB, 61 WB
	Heating Intake Air Temp [Maximum / Minimum]	°F	77 DB / 59 DB

NOTES:

AHRI Rated Conditions (Rated data is determined at a fixed compressor speed)

[1]Cooling (Indoor // Outdoor)	°F	80 DB, 67 WB // 95 DB, 75 WB
[2]Heating at 47°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 47 DB, 43 WB
[3]Heating at 17°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 17 DB, 15 WB

Conditions

[4]Heating at 5°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 5 DB, 4 WB
[5]Heating at -4°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -4 DB, -5 WB
[6]Heating at -5°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -5 DB, -6 WB
[7]Heating at -13°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -13 DB, -14 WB

*Outdoor Unit Operating Temperature Range (Cooling Air Temp (Maximum / Minimum)):
- Wind baffles required to operate below 23°F DB in cooling mode.
- Heat pump system with wind baffle: 0°F - 115°F.
- Refer to wind baffle documentation for further information.

**Outdoor Unit Operating Temperature Range (Cooling Thermal Lock-out / Re-start Temperatures; Heating Thermal Lock-out / Re-start Temperatures):
- System cuts out in heating mode to avoid thermistor error and automatically restarts at these temperatures.

SEACOAST PROTECTION (TRU*A0*******BA MODELS)
- External Outer Panel: Phosphate coating + Acrylic-Enamel coating
- Fan Motor Support: Epoxy resin coating (at edge face)
- Separator Assembly Valve Bed: Epoxy resin coating (at edge face)
- Blue Fin treatment is an anti-corrosion treatment that is applied to the condenser coil to protect it against airborne contaminants.

SPECIFICATIONS: TPLA0A0361EA70A & TRUZA0361KA70(N/B)A

Outdoor Unit	MCA	A	25.0
	MOCP	A	31
	Fan Motor Full Load Amperage	A	0.5 + 0.5
	Fan Motor Output	W	74
	Airflow Rate	CFM	3880/3880
	Refrigerant Control		LEV
	Defrost Method		Reverse Cycle
	Coating on Heat Exchanger		Blue Fin Coating (BS Model only)
	Sound Pressure Level, Cooling[1]	dB(A)	52
	Sound Pressure Level, Heating[2]	dB(A)	53
	Compressor Type		INVERTER-driven twin rotary
	Compressor Model		MNB33FBRMC-L
	Compressor Rated Load Amps	A	8
	Compressor Locked Rotor Amps	A	13.0
	Compressor Oil Type // Charge	oz.	FV50S // 45
	External Finish Color		Ivory Munsell 3Y 7.8/1.1
	Base Pan Heater		N/A
	Unit Dimensions	W x D x H: In. [mm]	41-5/16 x 13 (+1-3/16) x 52-11/16 [1050 x 330 (+30) x 1338]
	Package Dimensions	W x D x H: In. [mm]	42-15/16 x 17-11/16 x 56-4/16 [1091 x 450 x 1429]
	Unit Weight	Lbs. [kg]	214 [97]
	Package Weight	Lbs. [kg]	245 [111]
Outdoor Unit Operating Temperature Range	Cooling Air Temp [Maximum / Minimum]*	°F	115 DB / 0 DB
	Heating Air Temp [Maximum / Minimum]	°F	70 DB, 59 WB / -4 DB, -4 WB
	Heating Thermal Lock-out / Re-start Temperatures**	°F	-8 / -4
Refrigerant	Type		R410A
	Charge	Lbs, oz	10, 6.0
	Chargeless Piping Length	Ft. [m]	0.0 [30.0]
	Additional Refrigerant Charge Per Additional Piping Length	oz./Ft. [g/m]	0.7 [50]
Piping	Gas Pipe Size O.D. [Flared]	In.[mm]	5/8 [15.88]
	Liquid Pipe Size O.D. [Flared]	In.[mm]	3/8 [9.52]
	Maximum Piping Length	Ft. [m]	165 [50]
	Maximum Height Difference	Ft. [m]	100 [30]
	Maximum Number of Bends		15

NOTES:

AHRI Rated Conditions (Rated data is determined at a fixed compressor speed)

[1]Cooling (Indoor // Outdoor)	°F	80 DB, 67 WB // 95 DB, 75 WB
[2]Heating at 47°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 47 DB, 43 WB
[3]Heating at 17°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 17 DB, 15 WB

Conditions

[4]Heating at 5°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 5 DB, 4 WB
[5]Heating at -4°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -4 DB, -5 WB
[6]Heating at -5°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -5 DB, -6 WB
[7]Heating at -13°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -13 DB, -14 WB

*Outdoor Unit Operating Temperature Range (Cooling Air Temp (Maximum / Minimum)):
- Wind baffles required to operate below 23°F DB in cooling mode.
- Heat pump system with wind baffle: 0°F - 115°F.
- Refer to wind baffle documentation for further information.

**Outdoor Unit Operating Temperature Range (Cooling Thermal Lock-out / Re-start Temperatures; Heating Thermal Lock-out / Re-start Temperatures):
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SEACOAST PROTECTION (TRU*A0*******BA MODELS)
- External Outer Panel: Phosphate coating + Acrylic-Enamel coating
- Fan Motor Support: Epoxy resin coating (at edge face)
- Separator Assembly Valve Bed: Epoxy resin coating (at edge face)
- Blue Fin treatment is an anti-corrosion treatment that is applied to the condenser coil to protect it against airborne contaminants.

INDOOR UNIT ACCESSORIES: TPLA0A0361EA70A

Control Interface	3-Pin Connector	☐ PAC-715AD
	BACnet® and Modbus® Interface	☐ PAC-UKPRC001-CN-1
	CN24 Relay Kit	☐ CN24RELAY-KIT-CM3
	IT Extender	☐ PAC-WHS01IE-E
	kumo station® for kumo cloud®	☐ TAC-WHS01HC-E
	Lockdown bracket for remote controller	☐ RCMKP1CB
	Remote Operation Adapter‡	☐ PAC-SF40RM-E
	Thermostat Interface	☐ PAC-US444CN-1
	USNAP Adapter	☐ PAC-WHS01UP-E
	Wireless Interface for kumo cloud®	☐ PAC-USWHS002-WF-2
Remote Sensor	Flush Mount Temperature Sensor	☐ PAC-USSEN001-FM-1
	Remote Temperature Sensor	☐ PAC-SE41TS-E
	Wireless temperature and humitity sensor for kumo cloud®	☐ PAC-USWHS003-TH-1
Wired Remote Controller	Deluxe Wired MA Remote Controller†	☑ TAR-40MAAU
	Simple MA Remote Controller†	☐ TAC-YT53CRAU-J
	Touch MA Controller†	☐ TAR-CT01MAU-SB
Wireless Remote Controller	kumo touch™ RedLINK™ Wireless Controller	☐ MHK2
	Wireless Remote Contoller	☐ PAR-SL100A-E
	Wireless Signal Receiver Panel	☐ PAR-SR4LU-E
Casement	Multi-function Casement	☐ PAC-SJ41TM-E
Condensate	Blue Diamond (Advanced) Mini Condensate Pump w/ Reservoir & Sensor (208/230V) [recommended]	☐ X87-721
	Blue Diamond (MegaBlue Advanced) Condensate Pump w/ Reservoir & Sensor	☐ X87-835
	Blue Diamond Sensor Extension Cable — 15 Ft.	☐ C13-103
Disconnect Switch	(30A/600V/UL) [fits 2” X 4” utility box] - Black	☐ TAZ-MS303
	(30A/600V/UL) [fits 2” X 4” utility box] - White	☐ TAZ-MS303W
Filter	High Efficiency Filter Element	☐ PAC-SH59KF-E
i-see Sensor® Panel	Grille with 3D i-see Sensor® (required)	☑ TLP-41EAEU
Lineset	10’ x 3/8” x 10’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-10
	100’ x 3/8” x 100’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-100
	15’ x 3/8” x 15’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-15
	30’ x 3/8” x 30’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-30
	50’ x 3/8” x 50’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-50
	65’ x 3/8” x 65’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-65
Shutter Plate	Shutter Plate	☐ PAC-SJ37SP-E
Space Panel	Architectural Surround for Ceiling Recessed Units	☐ PLFY-ITP1
	Space Panel	☐ PAC-SJ38AS-E

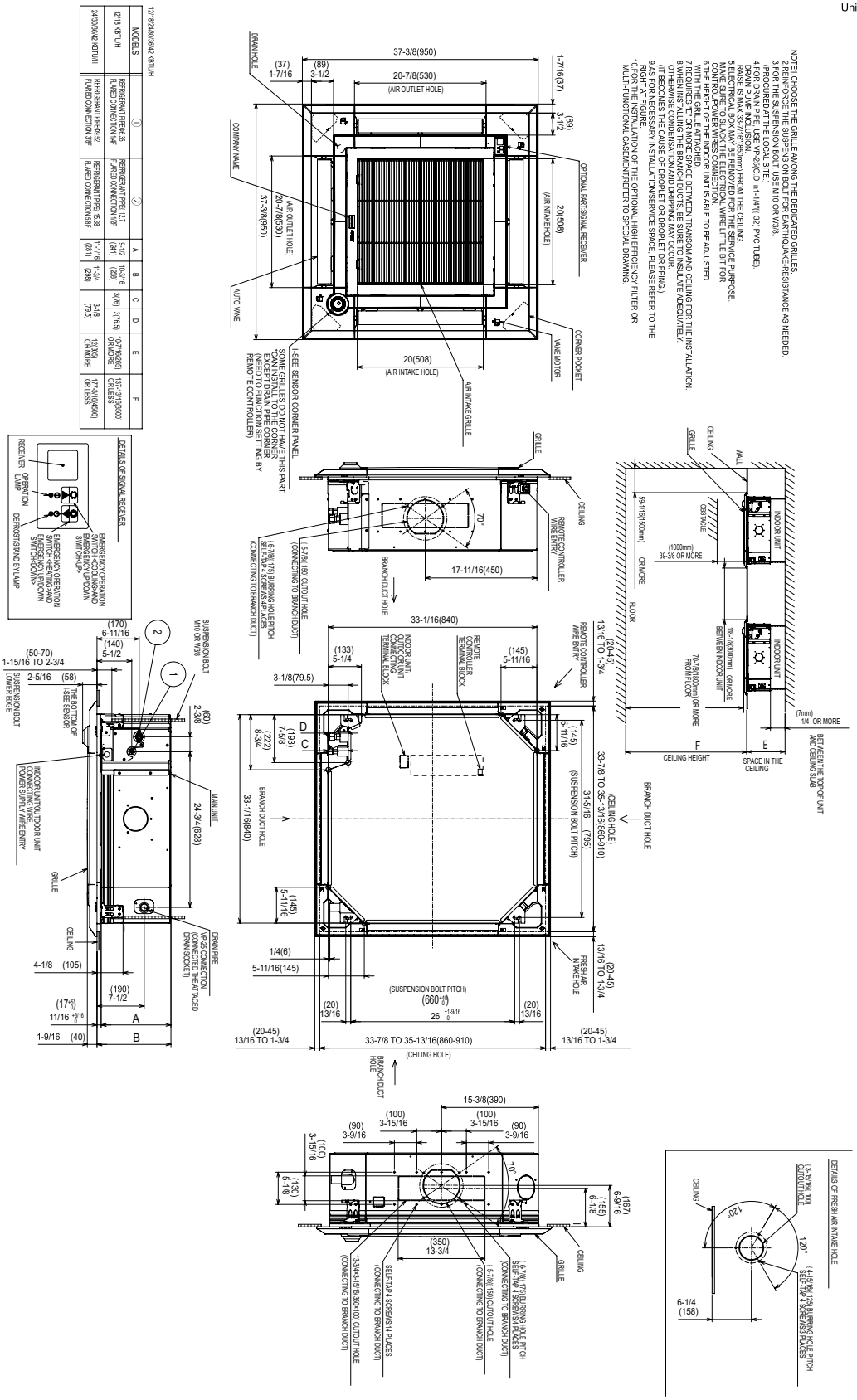
NOTES:
‡PAC-SF40RM-E (Unable to use with wireless remote controller)

OUTDOOR UNIT ACCESSORIES: TRUZA0361KA70(N/B)A

Air Outlet Guide	Air Outlet Guide (1 Piece)	☐ PAC-ADG096AA-E (two pieces are required)
Control/Service Tool	Control/Service Tool	☐ PAC-SK52ST
	M- & P-Series Maintenance Tool Cable Set	☐ M21EC0397
	USB/UART Conversion Cable (Required for all laptop connection)	☐ M21EC1397
Distribution pipe	Twinning Distribution Pipe (50:50)††	☐ MSDD-50TR-E
Drain Socket	Drain Socket	☐ PAC-SG61DS-E
M-NET Converter	M-NET Converter	☐ PAC-SJ85MA-E
	M-NET Converter	☐ PAC-SJ95MA-E
Mini-Split Wire	14 Gauge, 4 wire MiniSplit Cable—250 ft. roll	☐ S144-250
	14 Gauge, 4 wire MiniSplit Cable—50 ft. roll	☐ S144-50
	16 Gauge, 4 wire MiniSplit Cable—250 ft. roll	☐ S164-250
	16 Gauge, 4 wire MiniSplit Cable—50 ft. roll	☐ S164-50
Mounting Pad	Condensing Unit Mounting Pad: 24” x 42” x 3”	☐ ULTRILITE2
Stand	18” Dual Fan Stand	☐ QSMS1802M
	24” Dual Fan Stand	☐ QSMS2402M
	Condenser Wall Bracket	☐ QSWB2000M-1
	Condenser Wall Bracket -Stainless Steel Finish	☐ QSWBSS
	Outdoor Unit Stand — 12” High	☐ QSMS1202M
Wind Baffle	Front Wind Baffle	☐ WB-PA3 (two pieces are required)
	Rear Wind Baffle	☐ WB-RE6
	Side Advanced Wind Baffle	☐ WB-SD6

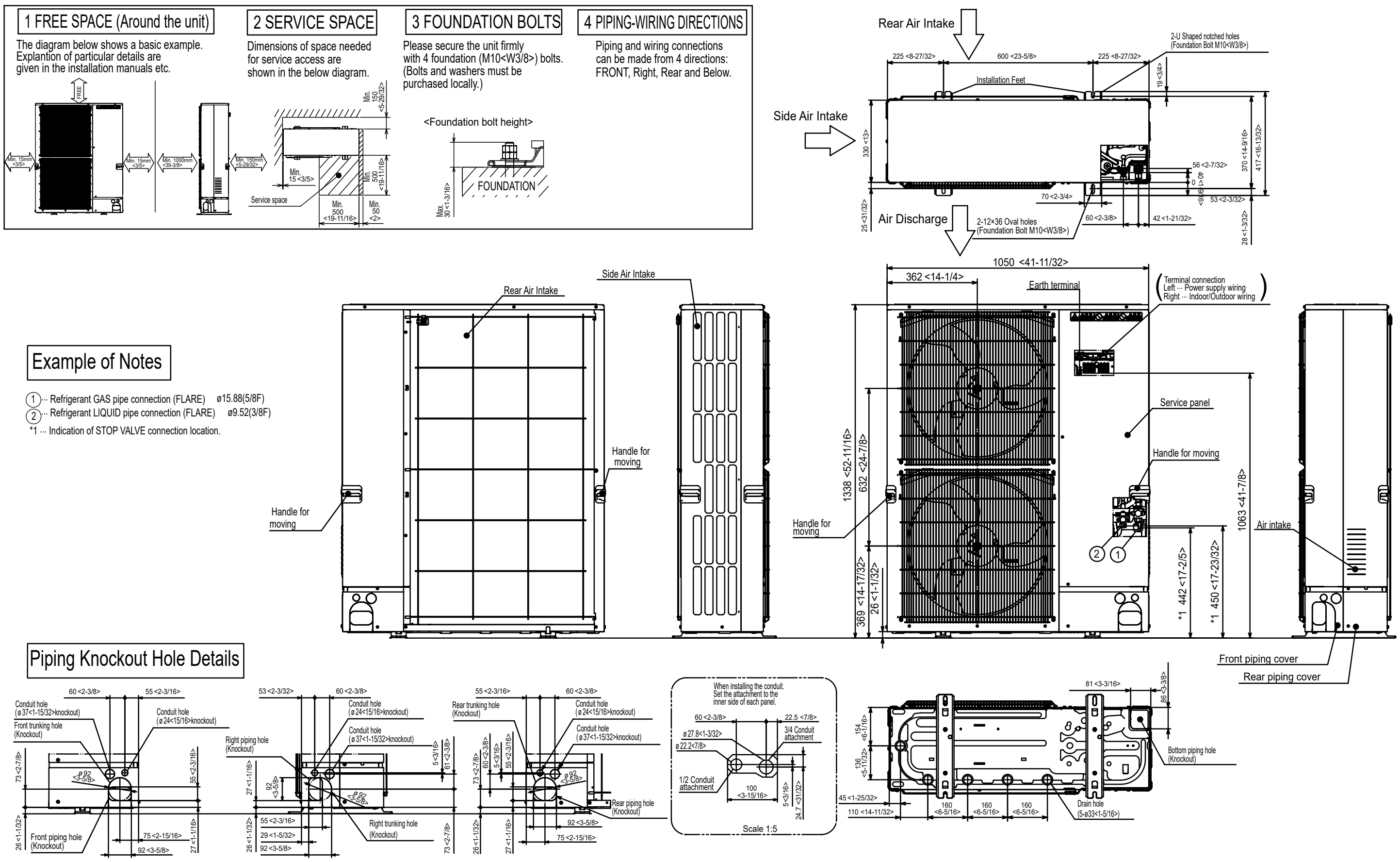
INDOOR UNIT DIMENSIONS: TPLA0A0361EA70A

Unit: inch (mm)



OUTDOOR UNIT DIMENSIONS: TRUZA0361KA70(N/B)A

Unit: mm<in>



FORM# TPLA0A0361EA70A & TRUZA0361KA70(N/B)A - 202108

Specifications are subject to change without notice.

TAR-40MAAU
Deluxe MA Remote Controller

Job Name: **Ft Lauderdale Fire Station 54**
System Reference: **AHU/CU-2** Date: **2-14-22**

FULL VIEW

BASIC VIEW

OPERATION/DISPLAY

- ON/OFF
  - Switches between ON and OFF.
- Operation mode switching
  - Switches between Cool/Dry/Fan/Auto/Setback/Heat.
- Hold
  - Switches between enable and disable the Hold function.
  - If the Hold function is enable, the following functions will be prohibited.
  - ON/OFF timer/Schedule (Weekly timer) /Auto return/Auto-OFF timer
- Temperature setting
  - Changes the set temperature.
  - Set temperature range varies depending on the indoor unit model.
- Fan speed setting
  - Changes fan speed.
  - Available fan speeds vary depending on the model.
- Air flow direction setting
  - Changes airflow direction.
  - Available airflow directions vary depending on the model.
- Louver setting
  - Switches between louver ON/OFF.
- Ventilation equipment control
  - Interlocked setting and interlocked operation setting with City Multi Lossnay units can be performed.
  - The Stop/Low/High settings of the ventilation equipment can be controlled.
- Main display mode setting
  - The Main display can be displayed in two different modes: “Full” and “Basic.”
- B&W inversion
  - The colors of the display can be inverted, turning white background to black and black characters to white.
- Clock *2
  - Date (year/month/day) and time (hour/minute) can be set.
  - The set time as well as the day of the week will be displayed on the Main display.
  - It is also possible for the time to not display on the main display.
  - The clock can be displayed in 12-hour format (AM/PM before or after the time) and 24-hour format.
- Daylight saving time
  - The start/end time for daylight saving time can be set.
  - The daylight saving time function will be activated based on the setting contents.
- Room temp. display
  - The room temperature display can be enabled or disabled.
- Error information
  - When an error occurs, an error code and the unit address appear.
  - The air-conditioning unit model, serial number, and contact number can be set to appear when an error occurs. (The above information needs to be entered in advance.)
- Filter information
  - A filter sign will appear when it is time to clean the filter.
- Remote controller information
  - The version of the remote controller can be checked.

*1 This function is active only for the units that support the function.
*2 The clock is accurate within 45 seconds per month (at the temperature of 77°F [25ºC]).
The clock is backed up for 3 days.

TAR-40MAAU

SCHEDULE AND TIMER SETTING

- Timer
  - ON/OFF timer
    - Turns ON and OFF daily at a set time.
    - Time can be set in 5-minute increments.
    - It is also possible to set the ON time only or the OFF time only.
  - Auto-OFF timer
    - Turns off the unit after a certain period of operation.
    - Operation time can be set to a value from 30 to 240 minutes in 10-minute increments.
- Weekly timer
  - Weekly ON/OFF times and set temperatures can be set.
  - Time can be set in 5-minute increments. Up to 8 schedule patterns can be set per day of the week.
  - Not valid when the ON/OFF timer is set.

RESTRICTION SETTINGS

- Allows/disallows local operation
  - The following operation can be prohibited by applying certain settings on the centralized controller: ON/OFF, operation mode, set temperature, filter sign reset, air direction, fan speed and timer.
  - While an operation is prohibited, the operation icon lights up (only on the Main display in the “Full” mode).
- Operation lock
  - The following operations can be prohibited: Sensing Location, ON/OFF, Mode, Set temp., Menu, Fan, Louver, Vane, or Hold
- Temperature range restriction
  - The room temperature range for each operation mode can be restricted.
- Auto return
  - The units operate at the preset temperature after a designated period.
    - Time can be set to a value from 30 to 120 minutes in 10-minute increments.
  - Not valid when the temperature setting range is restricted.
- Password
  - Administrator password (required for schedule setting etc.) and Maintenance password (required for test run and function setting etc.) can be set.

MISCELLANEOUS ITEMS

- Language Selection
  - Select the display language from the following 3 languages.
    - English, French, Spanish
- Brightness Contrast
  - The brightness of the LCD can be adjusted. The contrast of the LCD can be adjusted.
- Manual Vane Angle *1
  - Fixes the vane position for each air outlet.
- Service *1
  - Contains Test run, Function setting, Request code, and Error history.
- 3D i-see Sensor
  - Settings for 3D i-see Sensor can be made.

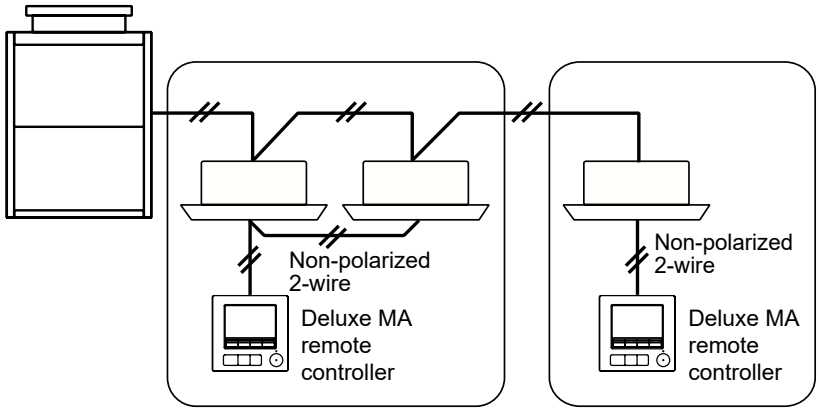
ENERGY SAVING OPTION

- No occupancy energy save
  - Requires 3D i-see sensor on applicable indoor units
- Room Occupancy energy save
  - Requires 3D i-see sensor on applicable indoor units
- No occupancy Auto-OFF
  - Requires 3D i-see sensor on applicable indoor units
- Setback Mode

*1 This function is active only for the units that support the function.
*2 The clock is accurate within 45 seconds per month (at the temperature of 77°F [25ºC]). The clock is backed up for 3 days.

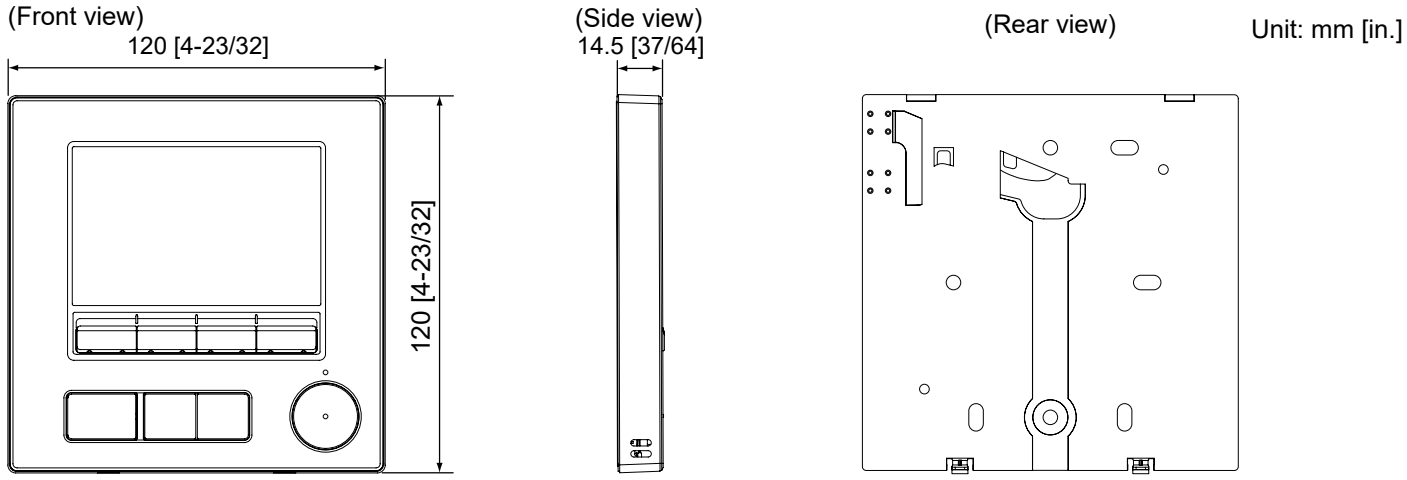
SYSTEM EXAMPLE

*When a TAR-40MAAU is connected to a group, no other MA remote controllers can be connected to the same group.



TAR-40MAAU

DIMENSIONS



COMPATIBILITY CHART

CITY MULTI®	Nv-Series	P-Series
TPMFYP*BM Yes	FKS MAC-334	TPCA Yes
TPWFYP*BU Yes	WST MAC-334	TPEAD Yes
TPEFYP*MA Yes	WPH MAC-334	TPKA Yes
TPEFY*MH Yes	MSY-HM MAC-334	TPLA Yes
TPEFY*MS Yes	WMT MAC-334	TPVA Yes
TPMFY*BM Yes	AMT Yes	
TPLFY*EM Yes	DKS Yes	
TPLFY*FM Yes	CKS Yes	
TPKFY*LM Yes	UKS MAC-334	
PCFY-VKM Yes	Note: MAC-334 indicates that the unit requires a MAC-334IF-E Adapter in order to use the TAR-40MAAU	
TPCFY*KM Yes		
TPFFY*CS [1] Yes		
TPFFY*RE Yes		
TPVFY*AM Yes		
TPKFY*BM Yes		
TPKFY*HM Yes		

SPECIFICATIONS

Product size (W x H x D)	In. (mm)	4 3/4 x 4 3/4 x 0.57 (120 x 120 x 14.5)
Net Weight	Lbs. (kg)	9/16 (0.25)
Rated Power Supply Voltage		12 VDC (supplied from indoor units)
Power Consumption	W	0.3
Usage Environment		Temperature: 0 to 40° C (32 to 104° F) Humidity: 30 to 90%RH (with no condensation)
Material	Panel	PMMA
	Main body	PC + ABS
Sound Pressure Level	dB(A)	<70 [A-weighted sound pressure level]

[1] Per Machinery Directive 2006/42/EC

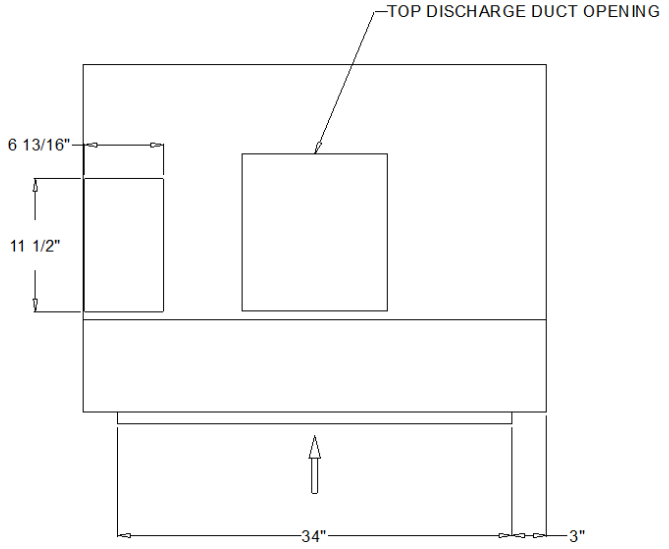
NOTES:

1. ACCESS PANELS ARE LOCATED ON BOTH SIDES OF THE UNIT TO PROVIDE ACCESS TO THE UNIT'S INTERNAL COMPONENTS.

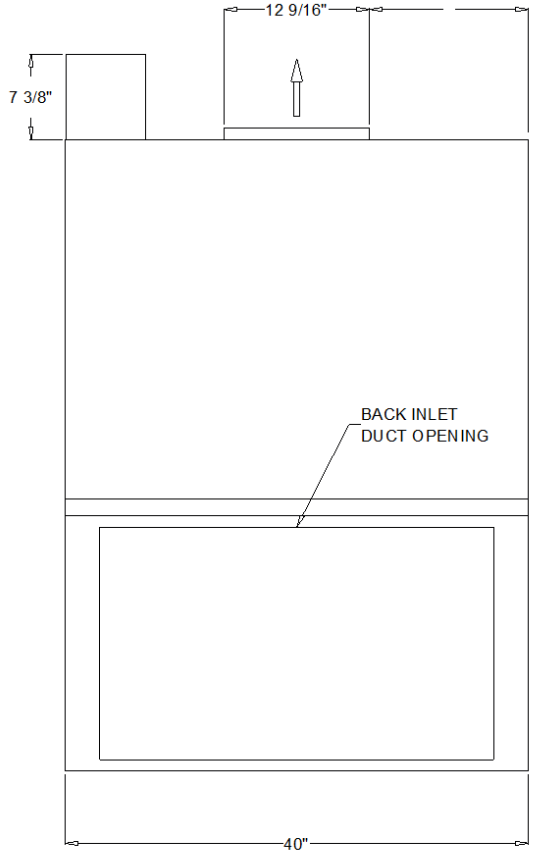
2. CONTROL BOX IS FACTORY MOUNTED ON DRIVE SIDE AND PROVIDED WITH 7/8" DIAMETER KNOCKOUTS FOR FIELD WIRING.

3. ARROWS INDICATE THE DIRECTION OF AIRFLOW.

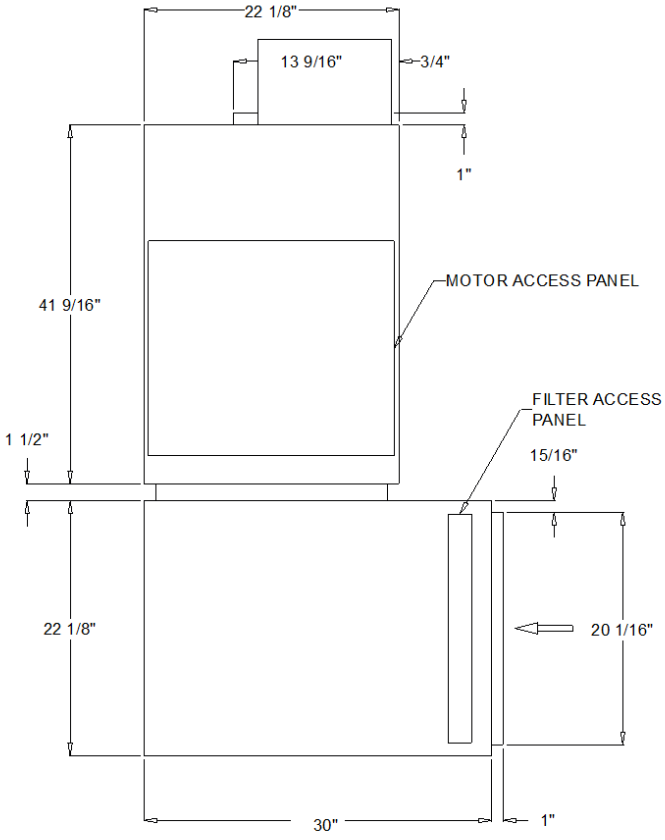
4. VERTICAL UNIT SHIPS IN TWO PIECES AND REQUIRES FIELD ASSEMBLY.



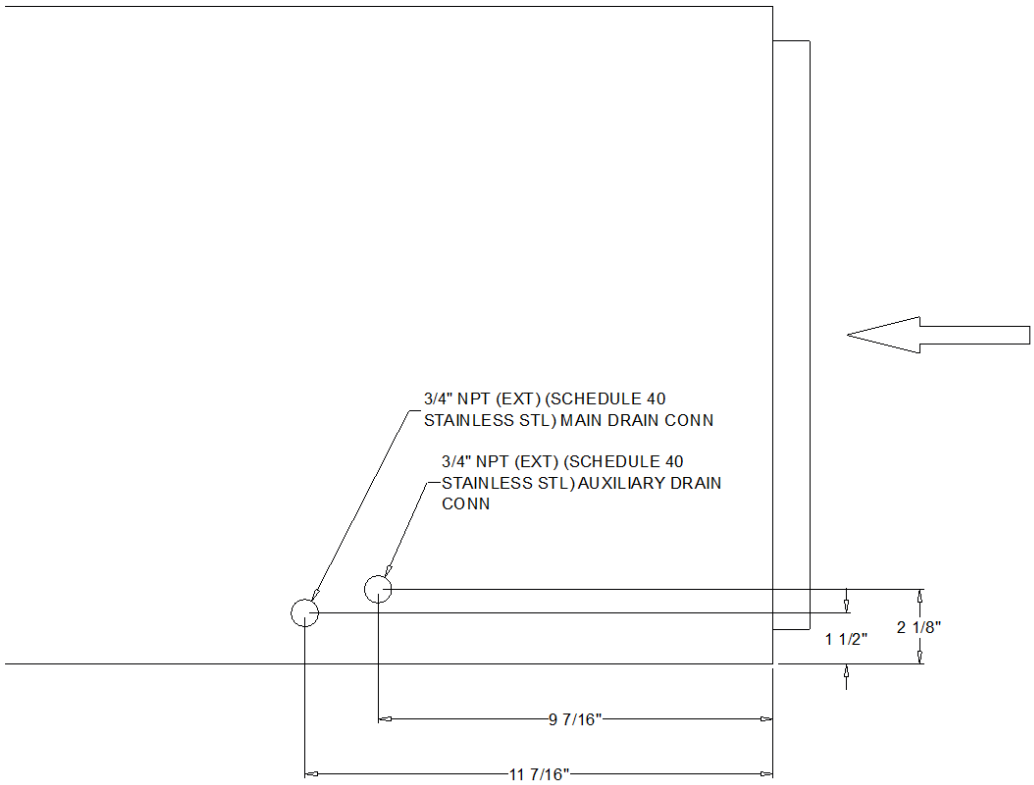
TOP VIEW



BACK VIEW



RIGHT VIEW



RIGHT VIEW

NOTES:
1. ALL DIMENSIONS ARE SHOWN FROM THE BOTTOM REAR CORNER OF UNIT.
2. STUBOUTS PROTRUDE 2 1/8" FROM EXTERIOR CASING OF UNIT.
3. ARROW INDICATES THE DIRECTION OF AIRFLOW.

NOTES:

1. WEIGHT OF BASIC UNIT INCLUDES ONLY CABINET, FAN, AVERAGE DRIVE, WIRING AND AVERAGE FILTER.

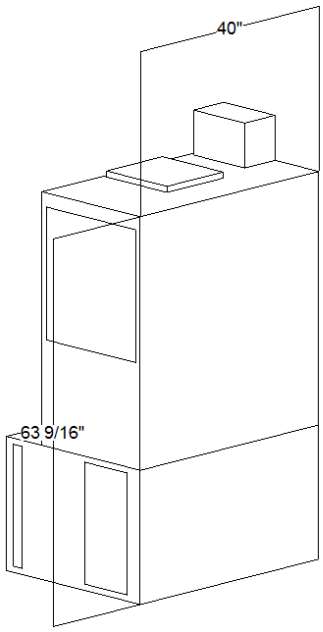
2. WEIGHT OF STEAM COIL MODULE INCLUDES ONLY CABINET WITH AVERAGE FILTER.

3. BEFORE PREPARING ANY UNIT OR ACCESSORY MODULE FOR LIFTING, ESTIMATE THE APPROXIMATE CENTER OF GRAVITY AND TEST LIFT THE UNIT OR ACCESSORY MODULE TO DETERMINE BALANCE AND STABILITY. USE A PROPER RIGGING METHOD SUCH AS STRAPS, SLINGS OR SPREADER BARS FOR PROTECTION AND SAFETY BEFORE HOISTING THE UNIT OR ACCESSORY MODULE.

4. DO NOT LIFT UNITS OR ACCESSORY MODULES IN WINDY CONDITIONS OR ABOVE INSTALLATION PERSONNEL. FAILURE TO PROPERLY LIFT UNIT OR ACCESSORY MODULE COULD RESULT IN DEATH, SERIOUS INJURY, EQUIPMENT DAMAGE OR PROPERTY-ONLY DAMAGE.

5. DO NOT RIG OR LIFT UNITS OR ACCESSORY MODULES WITH FORK LIFT FORKS.

6. ASSEMBLY OF THE UNIT MUST BE PERFORMED AT THE INSTALLATION SITE. ALWAYS RIG UNITS AND ACCESSORY MODULES AS SHIPPED FROM THE FACTORY.



ISO1 VIEW

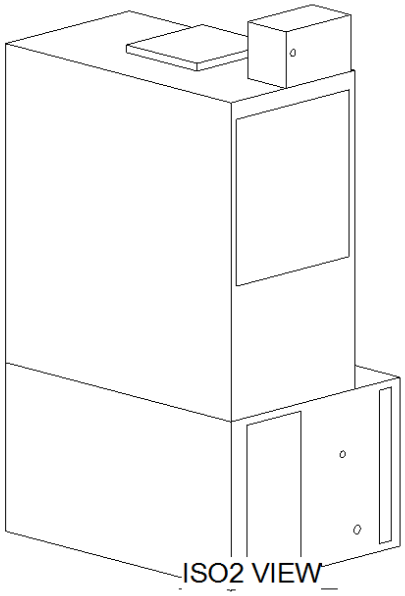
UNIT, COIL & ACCESSORY MODULE WEIGHTS

BASIC UNIT	COIL 1 DRY	COIL 1 WET	COIL 2 DRY	COIL 2 WET	MOTOR	ELECTRIC HEATER	MIXING BOX	ANGLED FILTER BOX	ANGLED FILTER MIXING BOX
197.0 lb	52.4 lb				56.0 lb				

FILTER ACCESS MODULE	STEAM COIL MODULE	Control Box
		7.0 lb

STEAM COIL DRY	STEAM COIL WET

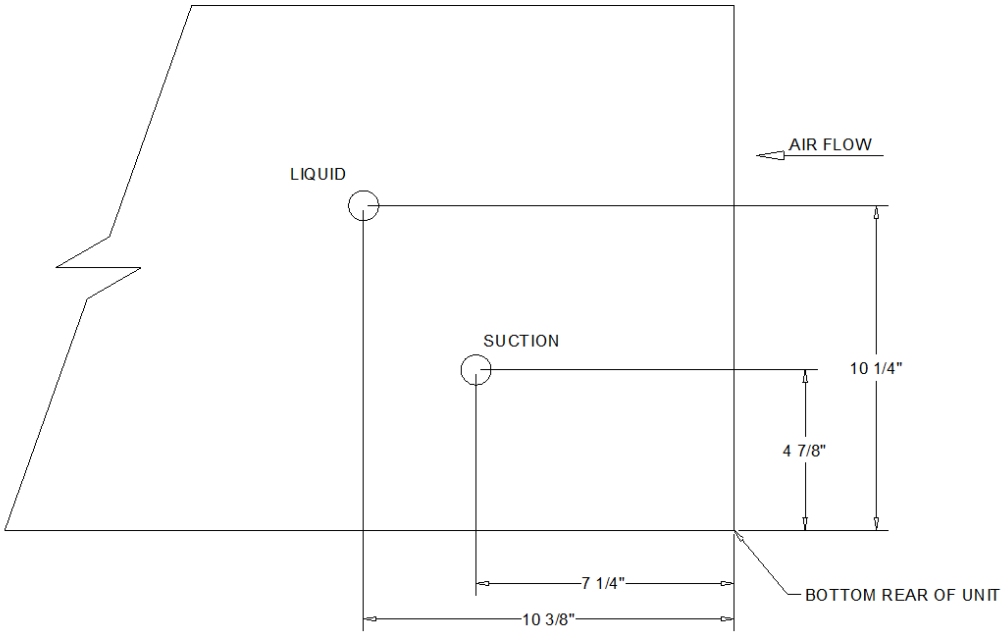
UNIT SIZE	SERVICE CLEARANCE
54	37"



ISO2 VIEW

MAIN UNIT COIL CONNECTIONS

LIQUID	7/8"
SUCTION	1 1/8"



NOTES:

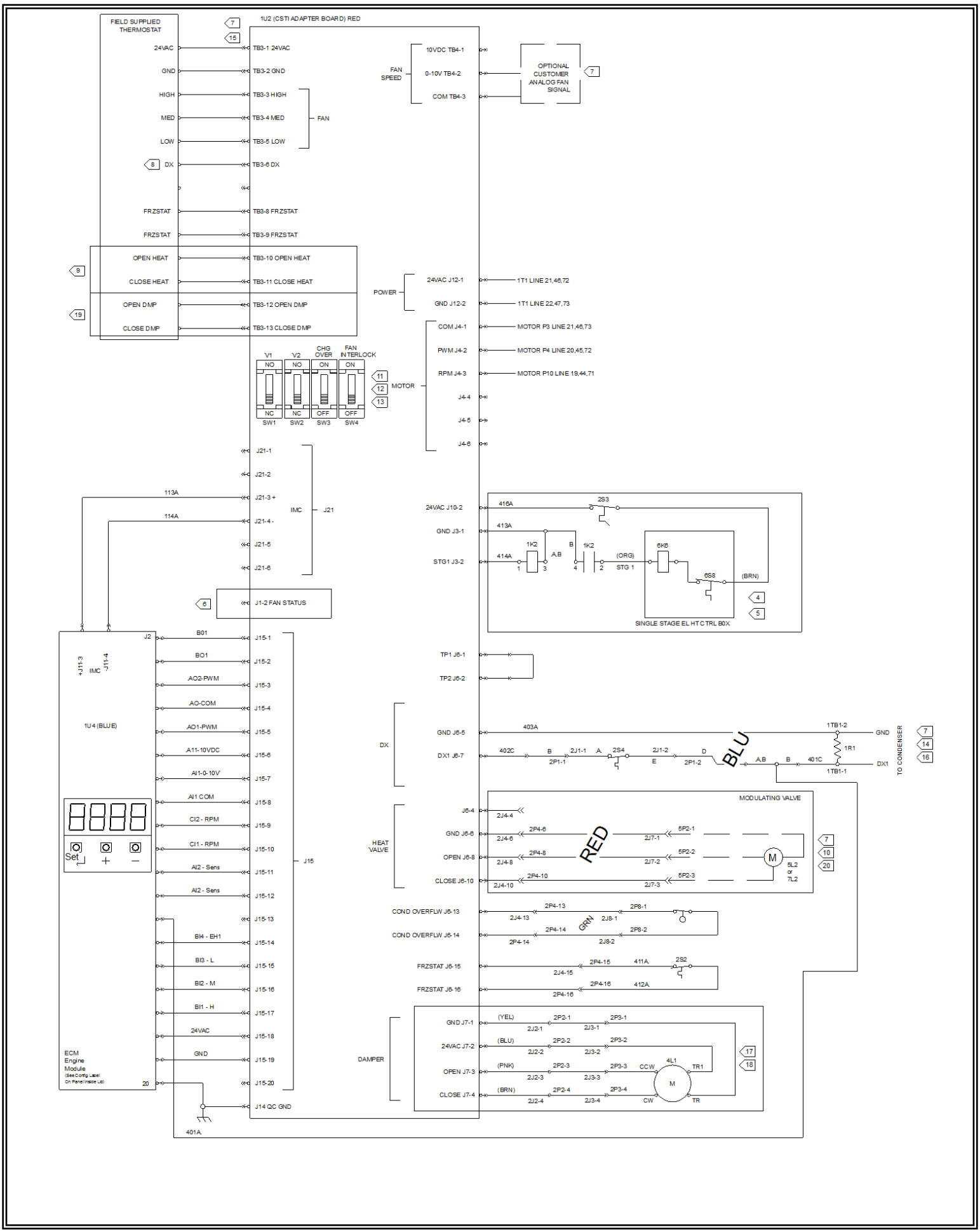
1. PICTORIAL HEADER STUBOUT LOCATIONS RELATIVE TO EACH OTHER MAY NOT BE ACCURATE.

2. LOCATING DIMENSIONS HAVE A PLUS / MINUS 2" TOLERANCE.

3. FOR UNITS WITH A FILTER ACCESS MODULE, ADD 7 3/16" TO HORIZONTAL DIMENSIONS SHOWN.

4. PIPING CONNECTIONS ARE SPECIFIED AS OUTSIDE DIAMETER (O.D.).

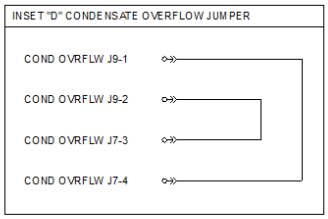
5. THERMAL EXPANSION VALVE IS TO BE FIELD SUPPLIED FOR DX COOLING.

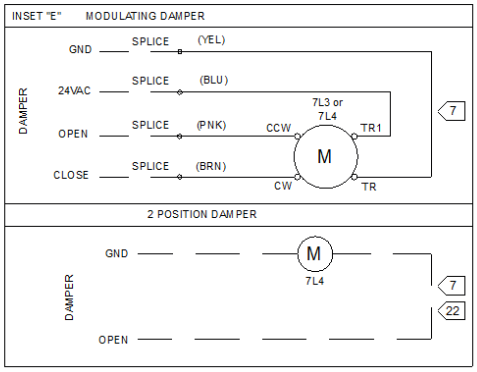

FIELD SUPPLIED THERMOSTAT
1U2 (CSTI ADAPTER BOARD) RED
24VAC
GND
HIGH
MED
LOW
DX
FRZSTAT
FRZSTAT
OPEN HEAT
CLOSE HEAT
OPEN DMP
CLOSE DMP
TB3-1 24VAC
TB3-2 GND
TB3-3 HIGH
TB3-4 MED
TB3-5 LOW
TB3-6 DX
TB3-8 FRZSTAT
TB3-9 FRZSTAT
TB3-10 OPEN HEAT
TB3-11 CLOSE HEAT
TB3-12 OPEN DMP
TB3-13 CLOSE DMP
FAN
10VDC TB4-1
0-10V TB4-2
COM TB4-3
FAN SPEED
OPTIONAL CUSTOMER ANALOG FAN SIGNAL
POWER
24VAC J12-1
GND J12-2
1T1 LINE 21,46,72
1T1 LINE 22,47,73
COM J4-1
PWM J4-2
RPM J4-3
J4-4
J4-5
J4-6
MOTOR P3 LINE 21,46,73
MOTOR P4 LINE 20,45,72
MOTOR P10 LINE 19,44,71
MOTOR
V1
V2
CHG OVER
FAN INTERLOCK
NO
NC
ON
OFF
SW1
SW2
SW3
SW4
J21-1
J21-2
J21-3 +
J21-4 -
J21-5
J21-6
IMC
J21
113A
114A
J1-2 FAN STATUS
24VAC J10-2
GND J3-1
STG1 J3-2
416A
413A
414A
2S3
1K2
A,B
B
(ORG)
STG 1
6K6
6S8
(BRN)
SINGLE STAGE EL HT CTRL BOX
J2
+J11-3
IMC
-J11-4
1U4 (BLUE)
B01
BO1
AO2-PWM
AO-COM
AO1-PWM
AI1-10VDC
AI1-0-10V
AI1 COM
CI2 - RPM
CI1 - RPM
AI2 - Sens
AI2 - Sens
BI4 - EH1
BI3 - L
BI2 - M
BI1 - H
24VAC
GND
J14 QC GND
J15
J15-1
J15-2
J15-3
J15-4
J15-5
J15-6
J15-7
J15-8
J15-9
J15-10
J15-11
J15-12
J15-13
J15-14
J15-15
J15-16
J15-17
J15-18
J15-19
J15-20
Set
ECM Engine Module
(See Config Label On Panel Inside Lid)
20
401A
TP1 J6-1
TP2 J6-2
DX
GND J6-5
DX1 J6-7
403A
402C
2P1-1
2J1-1
2S4
2J1-2
2P1-2
BLU
1TB1-2
GND
1R1
1TB1-1
DX1
401C
TO CONDENSER
HEAT VALVE
J6-4
GND J6-6
OPEN J6-8
CLOSE J6-10
2J4-4
2P4-6
2J4-6
2P4-8
2J4-8
2P4-10
2J4-10
RED
2J7-1
2J7-2
2J7-3
5P2-1
5P2-2
5P2-3
MODULATING VALVE
M
6L2 or 7L2
COND OVERFLW J6-13
COND OVERFLW J6-14
2P4-13
2J4-13
2P8-1
2J8-1
2P4-14
2J4-14
2P8-2
2J8-2
GRN
FRZSTAT J6-15
FRZSTAT J6-16
2P4-15
2J4-15
411A
2S2
2P4-16
2J4-16
412A
DAMPER
GND J7-1
24VAC J7-2
OPEN J7-3
CLOSE J7-4
(YEL)
(BLU)
(PNK)
(BRN)
2P2-1
2P2-2
2P2-3
2P2-4
2J2-1
2J2-2
2J2-3
2J2-4
2P3-1
2P3-2
2P3-3
2P3-4
2J3-1
2J3-2
2J3-3
2J3-4
CCW
CW
4L1
TR1
TR

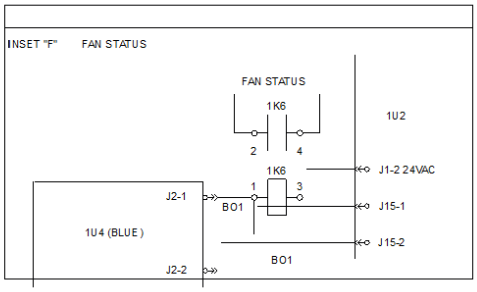
NOTES:

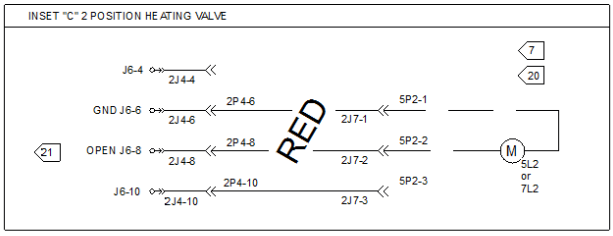
1. UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50 % RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINED ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. SOLID LINES INDICATE WIRING BY TRANE.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC). STATE AND LOCAL REQUIREMENTS. ALL FIELD WIRING MUST HAVE AN INSULATION VOLTAGE RATING THAT EQUALS OR EXCEEDS UNIT RATED VOLTAGE.

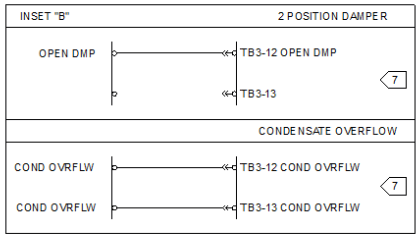
4. ELECTRIC HEAT SCHEMATIC IS LOCATED IN THE ELECTRIC HEAT CONTROL BOX PANEL.
5. WIRING SHOWN IS FOR SINGLE STAGE ELECTRIC HEAT.
6. SEE INSET "F" FOR FAN STATUS WIRING. (CTRL = N).
7. USE CLASS 2 WIRING.
8. FIELD CONNECTIONS SHOWN ON TB3-6 IS FOR SINGLE STAGE DX.
9. FIELD CONNECTIONS SHOWN ON TB3-10 AND TB3-11 ARE FOR HEATING MODULATING VALVES. FIELD INSTALLED ACTUATOR UTILIZES THE SAME CONNECTION POINTS AS FACTORY WIRING. SEE INSET "A" FOR FIELD CONNECTIONS TO HEATING TWO POSITION VALVES AND SINGLE STAGE ELECTRIC HEAT.
10. WIRING SHOWN IS FOR MODULATING VALVES. SEE INSET "C" FOR HEATING 2 POSITION VALVE SELECTIONS. FIELD SUPPLIED ACTUATOR WIRING UTILIZES THE SAME CONNECTION POINTS AS FACTORY ACTUATOR WIRING.
11. SW1 AND SW2 ARE SHOWN IN THE OFF POSITION. SW1 AND OR SW2 ARE TURNED OFF WHEN VALVES ARE NORMALLY CLOSED OR MODULATING (CVT1 OR CVT2 = A,C,E,F,G,J). SW1 AND/OR SW2 ARE TURNED ON WHEN VALVES ARE NORMALLY OPEN. (CVT1 OR CVT2 = B,D,H).
12. SW3 IS SHOWN IN THE OFF POSITION. SW3 IS TURNED ON WHEN CHANGEOVER COILS ARE SELECTED (COL1 OR COL2 = J,K,R,T).
13. SW4 IS SHOWN IN THE OFF POSITION. SW4 IS TURNED ON WHEN UNIT HAS ELECTRIC HEAT (STGE = 1,2,3).
14. WIRING SHOWN IS FOR SINGLE STAGE DX SELECTION.
15. 24V OUTPUT IS RATED 15VA
16. FIELD INSTALLED CONDENSING UNIT CAN BE WIRED BETWEEN TERMINALS 1TB1-1 TO 1TB1-2 FOR SINGLE STAGE. REMOVE RESTISTOR 1R1 PRIOR TO WIRING CONDENSOR. DX 1 OUTPUTS RATED FOR 24VAC 6VA MAXIMUM.
17. WIRING SHOWN IS FOR FACTORY INSTALLED MODULATING DAMPER. SEE INSET "D" FOR CONDENSATE OVERFLOW JUMPER. SEE INSET "E" FOR 2 POSITION DAMPER AND MODULATING FIELD SUPPLIED/ SHIP LOOSE DAMPER WIRING.
18. REMOVE TEST JUMPER PRIOR TO CONNECTING MIXING BOX TO MAIN UNIT.
19. FIELD CONNECTIONS SHOWN ON TB3-12 AND TB3-13 ARE FOR MODULATING DAMPER. SEE INSET "B" FOR 2 POSITION DAMPER AND CONDENSATE OVERFLOW FIELD WIRING.
20. FIELD SUPPLIED ACTUATOR WIRING UTILIZES THE SAME CONNECTION POINTS AS FACTORY ACTUATOR WIRING.
21. VALVES SHOWN IN NORMALLY CLOSED POSITION, FOR NORMALLY OPEN POSITION, THE VALVE SIGNAL BECOMES CLOSE.
22. DAMPER SHOWN IN NORMALLY CLOSED POSITION, FOR NORMALLY OPEN POSITION, THE DAMPER SIGNAL BECOMES CLOSE.

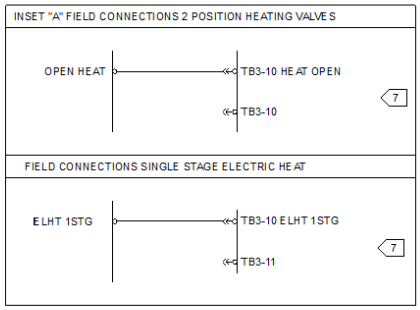






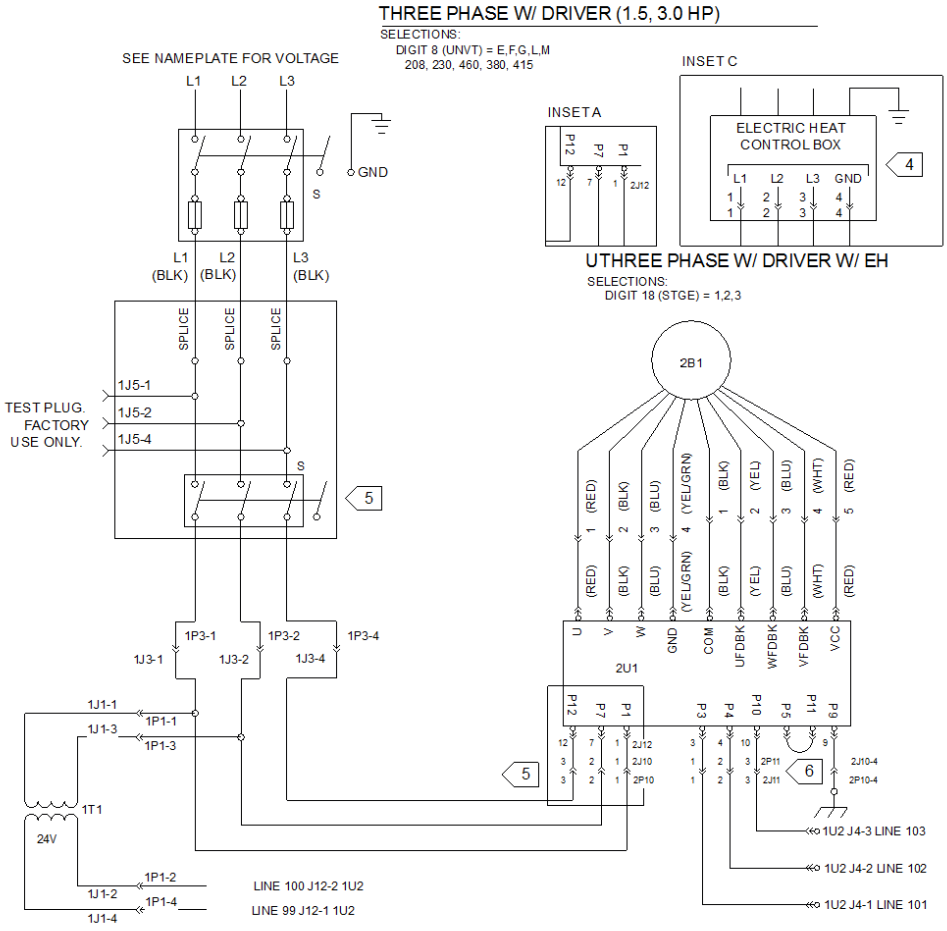






LEGEND		
DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
1U2	ADAPTER BOARD	88,80
1U4	ENGINE BOARD	83,114
2S3	EL HT LOCKOUT SWITCH	109
6K6	CONTACTOR; EL HT STG 1	111
6S8	EL HT HIGH TEMP	112
1K2	CONTACTOR; EL HT	111
1K6	RELAY; FAN STATUS	80,83
5L2	HEATING COIL VALVE MOTOR	98,123
7L2	HEATING COIL VALVE MOTOR	98,123
2S1	CONDENSATE OVERFLOW SWTCH	126
2S2	FREEZESTAT	128
1R1	RESISTOR; DX STG 1 TEST	118
2S4	FROSTSTAT	119
7L3	MIXING BOX DAMPER ACTUATOR	111
7L4	OUTSIDE AIR DAMPER ACTUATOR	111,114
4L1	MIXING BOX DAMPER ACTUATOR	133

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN AND COIL SECTION
3	
4	
5	EXTERNAL PIPING
6	ELECTRIC HEAT CONTROL BOX
7	FIELD INSTALLED DEVICE



WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.

FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE, PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

ADVERTENCIA

¡VOLTAJE PELIGROSO!

DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR.

EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

NOTICE

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!

LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.

FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!

LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.

NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

NOTES:

1. UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50 % RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.

2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINED ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. SOLID LINES INDICATE WIRING BY TRANE CO.

3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

4 ELECTRIC HEAT SCHEMATIC IS LOCATED IN THE ELECTRIC HEAT CONTROL BOX PANEL.

5 WIRING SHOWN IS FOR NO ELECTRIC HEAT. FOR ELECTRIC HEAT SINGLE PHASE SEE INSET A&B. FOR ELECTRIC HEAT THREE PHASE SEE INSET A&C.

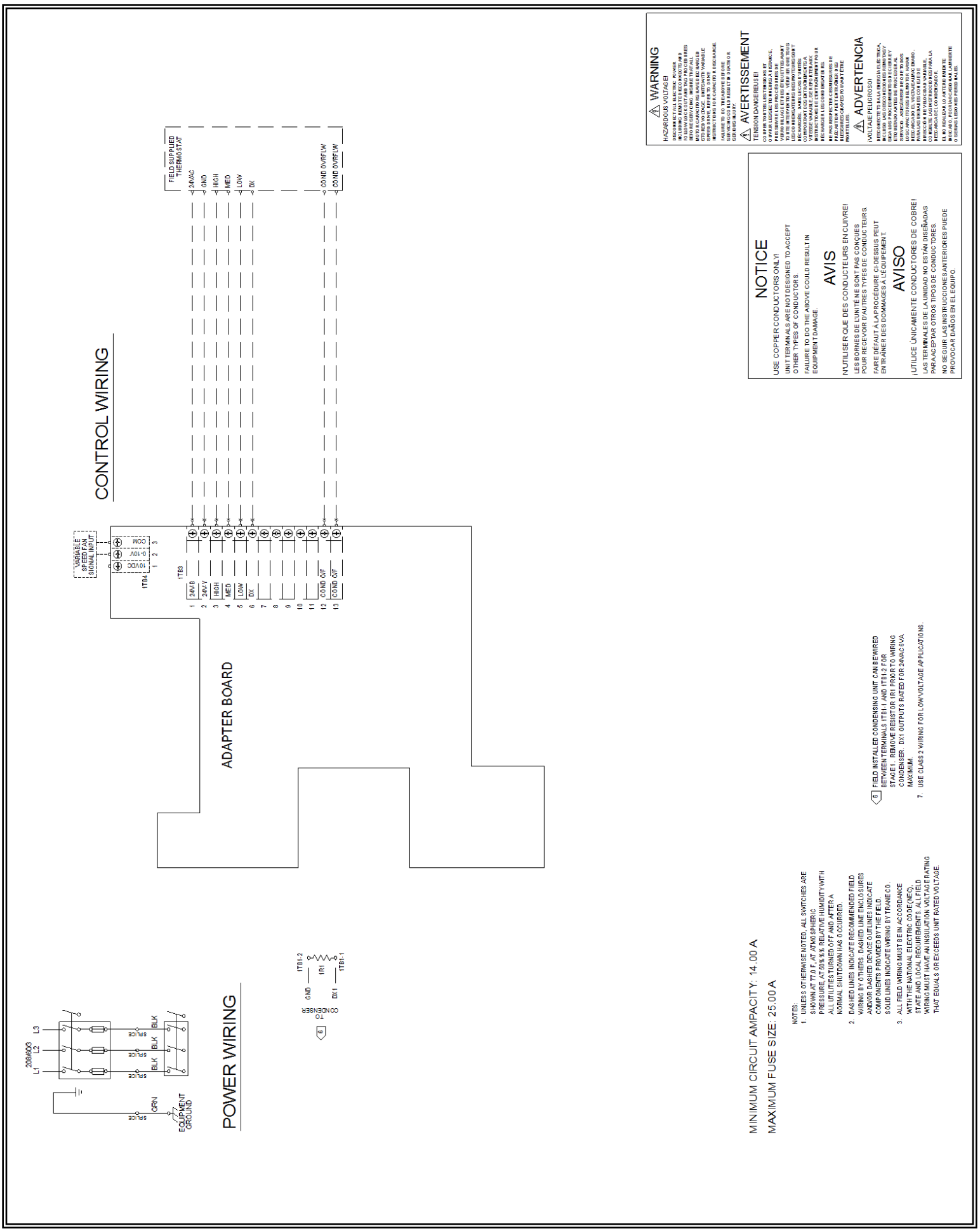
6 CW JUMPER IS PRESENT FROM PIN P5 TO P11 ON UNITS WITH CW MOTOR ROTATION AS VIEWED FROM SHAFT END.

7 MOTOR VOLTAGE CONFIGURATION P2-P8 JUMPERED FOR 115V OPERATION ONLY.

8 USE COPPER CONDUCTORS ONLY.

LEGEND		
DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
SINGLE PHASE		
7S2	FUSED DISCONNECT SWITCH	3
1S1	MANUAL DISCONNECT SWITCH	12
1T1	TRANSFORMER	20
2B1	FAN MOTOR	14
THREE PHASE (0.5, 1 HP)		
7S2	FUSED DISCONNECT SWITCH	29
1S1	MANUAL DISCONNECT SWITCH	40
1T1	TRANSFORMER	48
2B1	FAN MOTOR	41

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN AND COIL SECTION
3	
4	
5	EXTERNAL PIPING
6	ELECTRIC HEAT CONTROL BOX
7	FIELD INSTALLED DEVICE


CONTROL WIRING
ADAPTER BOARD
POWER WIRING
FIELD SUPPLIED THERMOSTAT
24VAC
GND
HIGH
MED
LOW
DX
COND OVRFLW
VARIABLE SPEED FAN SIGNAL INPUT
0-10V
10VDC
COM
1TB3
1TB4
1TB1-2
1TB1-1
IR1
GND
DX1
CONDENSER
208/60/3
L1
L2
L3
GRN
EQUIPMENT GROUND
BLK
SPLICE
WARNING
HAZARDOUS VOLTAGE!
NOTICE
USE COPPER CONDUCTORS ONLY!
AVIS
N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!
AVISO
¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!
AVERTISSEMENT
ADVERTENCIA
MINIMUM CIRCUIT AMPACITY: 14.00 A
MAXIMUM FUSE SIZE: 25.00 A
NOTES:
1. UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 77.0 F, AT ATMOSPHERIC PRESSURE, AT 50% % RELATIVE HUMIDITY WITH ALL UTILITIES TURNED OFF AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. SOLID LINES INDICATE WIRING BY TRANE CO.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS. ALL FIELD WIRING MUST HAVE AN INSULATION VOLTAGE RATING THAT EQUALS OR EXCEEDS UNIT RATED VOLTAGE.
6. FIELD INSTALLED CONDENSING UNIT CAN BE WIRED BETWEEN TERMINALS 1TB1-1 AND 1TB1-2 FOR STAGE 1. REMOVE RESISTOR IR1 PRIOR TO WIRING CONDENSER. DX1 OUTPUTS RATED FOR 24VAC 6VA MAXIMUM.
7. USE CLASS 2 WIRING FOR LOW VOLTAGE APPLICATIONS.

NOTES:

ALL DIMENSIONS ARE IN INCHES

ALL COIL CONNECTIONS ARE SWEAT STYLE. WEIGHT OF BASIC UNIT INCLUDES CABINET, FAN, WIRING AND AVERAGE FILTER.

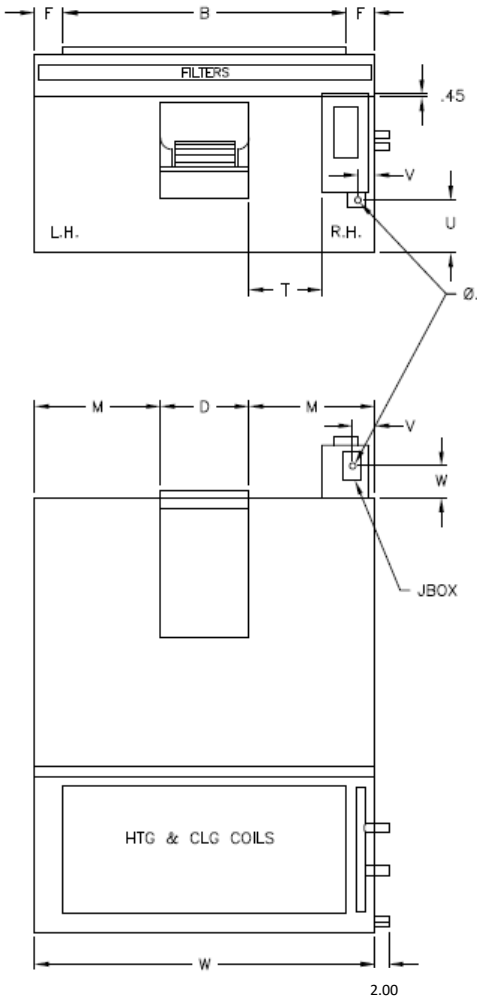
ADD TO BASIC UNIT WEIGHT, 7 LBS FOR WEIGHT OF CONTROL BOX.

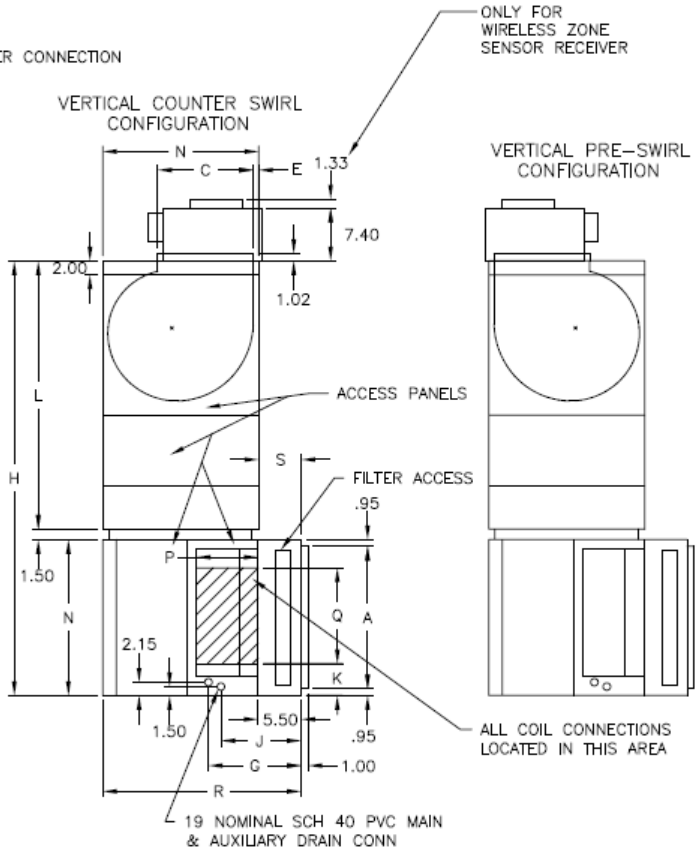
CONTROL BOX FACTORY MOUNTED ON MOTOR SIDE.

VERTICAL COIL & FILTER SECTION SHIPS SEPARATE FOR FIELD INSTALLATION. REFER TO INSTALLATION & MAINTENANCE MANUAL FOR INSTRUCTIONS.

VERTICAL UNITS PROVIDED WITH 4" TO 6" HIGH MOUNTING LEGS. LEGS ARE SEISMIC RATED.

VERTICAL NON–ELECTRIC HEAT BLOWER COIL





UNIT SIZE	H	W	L	A	B	C	D	E	F	G R.H.	G L.H.	J R.H.	J L.H.
24	51.72	28.00	32.22	16.09	22.00	13.57	9.04	1.30	3.00	11.42	13.42	9.42	11.42
36	51.72	40.00	32.22	16.09	34.00	13.57	9.04	1.30	3.00	11.42	13.42	9.42	11.42
54	63.57	40.00	40.07	20.09	34.00	13.58	12.57	0.72	3.00	11.42	13.42	9.42	11.42
72	63.57	48.00	40.07	20.09	40.00	13.58	12.57	0.72	4.00	11.42	13.42	9.42	11.42
90	71.94	48.00	42.44	26.09	40.00	13.58	12.57	1.66	4.00	12.79	14.79	10.79	12.79

UNIT SIZE	K	M	N	P	Q	R	S	T	U	V	W	BASIC UNIT WEIGHT
24	6.20	9.68	18.00	9.00	5.50	28.00	10.00	1.96	4.88	3.90	4.56	141.1
36	6.20	15.68	18.00	9.00	5.50	28.00	10.00	8.63	4.88	3.23	4.56	168.8
54	4.21	13.72	22.00	11.00	7.27	30.00	8.00	6.87	8.88	3.23	4.56	197.4
72	4.18	17.72	22.00	11.00	7.27	30.00	8.00	5.83	8.88	8.27	4.56	218.0
90	4.81	17.72	28.00	11.25	11.64	30.00	2.00	7.84	14.88	6.26	4.56	246.4

Submittal

Prepared For:
B&I Contractors

Date: February 14, 2022

Job Name:
Ft Lauderdale Fire Station 54

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	BCXD Blower Coil - Direct Drive (BCXD)
1	Split System Air Conditioning Units (Small)

Andrew Miller
Trane U.S. Inc.
2884 Corporate Way
Miramar, FL 33025
Office Phone: (954) 499-6900

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Please Note:

- Contractor to review submittal for accuracy prior to equipment release.
- Contractor to confirm hand connections on AHU prior to release.
- System controller and control devices are necessary to achieve True VAV operation as specified. These items shall be field installed by Trane Controls and will be submitted separately at a later date.

Table of Contents

Tag Data - BCXD Blower Coil - Direct Drive (BCXD) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	AHU-1	1	BCXD Blower Coil - Direct Drive (BCXD)	BCVD054E2

Product Data - BCXD Blower Coil - Direct Drive (BCXD)

Item: A1 Qty: 1 Tag(s): AHU-1

Vertical Counter-Swirl
Unit Size 54; 4-1/2 Ton
208/60/3
Foil Faced Insulation 1"
Motor, drive & control box on Same Side as Coil & Drainpan Connection – contractor to confirm
Stainless Steel Drainpan - Right Hand Coil & Drainpan Connections – contractor to confirm
6 Row DX, 3/16" Distributor
3 Horsepower EC motor
2" Pleated MERV 8 Throwaway Filter
Customer Supplied Terminal Interface
Condensate Overflow

Product Report - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

Unit Overview

Model Number	Cabinet Style	Unit Cabinet Size	Design Airflow	Elevation	External Dimensions			Weight	
					Length	Width	Height	Shipping	Operating
BCVD054	Vert Counter-swirl	54	2300 cfm	0.00 ft	30.000 in	40.000 in	70.970 in	312.8 lb	312.8 lb

Unit Features

Motor/Control Box Location or Intlet Style	Same Side as Coil (Hor or Vert C/S only)
Insulation	Foil Insulation
Coil Connection Side	SS Right Hand Coil & DP
Filter Type	2" Pleated MERV 8 TA

Motor/Electrical Information

Unit voltage	208/60/3
Short circuit current rating	5 kA RMS Symmetrical, 208V Maximum
ESP	1.500 in H2O
TSP	2.421 in H2O
ECM - Nominal Horsepower	3 hp
ECM - Brake Horsepower	1.577 hp
ECM - Max Brake Horsepower	2.960 hp
Full Load Amps	11.20 A
Fan Electrical Power	1525.0 W
Fan Electrical Power	Rated in accordance with AHRI 430-2020
Min Circuit Ampacity	14.00 A
Max Overcurrent Protection	25.00 A
Fan Speed	1341 rpm
Outlet Velocity	1940 ft/min

Coil Information

Coil #1	6R DX, 3/16" Dis (0.049)	Cooling Coil Face Velocity	575 ft/min
Heating Coil Type	DX - R410A	Motor Heat Calculation	Ignore

Coil Performance - Cooling			
Total cooling capacity	48.72 MBh	Liquid temp entering TXV	115.00 F
Sensible capacity	48.70 MBh	APD	0.706 in H2O
Cooling EDB	68.00 F	Saturated suction temp	45.00 F
Cooling EWB	55.00 F		
Cooling LDB	48.64 F		
Cooling LWB	46.56 F		

Controls, Sensors and Valves

Control type	CSTI
Factory Mounted End Devices Options	Condensate Overflow

Acoustics

Sound Path	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Inlet	87 dB	85 dB	67 dB	53 dB	56 dB	56 dB	58 dB	54 dB
Casing	83 dB	77 dB	65 dB	57 dB	58 dB	50 dB	47 dB	41 dB
Discharge	97 dB	89 dB	84 dB	79 dB	83 dB	77 dB	77 dB	72 dB
Inlet plus casing	85 dB	82 dB	68 dB	59 dB	61 dB	57 dB	58 dB	54 dB

Mechanical Specifications - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

BCVD General
The product line consists of a vertical air handling unit and optional mixing box. Air-handling airflow data is certified in accordance with AHRI standard 430. The unit is UL listed to U. S. and Canadian safety standards and complies with NFPA 90A. Air handlers consist of a hydronic and/or DX coil, drain pan, and centrifugal fan with motor in a common cabinet. Motor location and coil connections are independent for the same or opposite side location. Air handlers are provided with knockouts in all four corners for installing the unit suspended from the ceiling with threaded rods. Unit and accessories are insulated with 1" 1.5 lb/cu. ft density fiberglass insulation. 1" foil faced insulation is also available. Large motor access panels are provided on both sides of the unit and accessories.

Casing
Casings (structural components) are constructed of 18-gauge galvanized steel, insulated with 1" 1.5 lb/cu. ft density fiberglass fire resistant and odorless glass fiber material to provide thermal and acoustical insulation. Fan housing sides are directly attached to the air handler top and bottom panels strengthening the entire unit assembly. Coil access panels are located on both sides of the air handler and allow easy removal of the internal coils and drain pan. Main access panels provide generous access to the fan and motor from both sides of the air handler.

Foil Faced Insulation
The interior surface of the unit is acoustically and thermally lined with 1" 2.0 lb/cu. ftR-Value of 4.3 density glass fiber with a foil facing. The insulation is UL listed and meets NFPA-90A, UL 181 and bacteriological C665 standards.

Coil #1 Direct Expansion (DX) Coils
DX coils for use with refrigerant 410a, have 3/8" x .012" W round seamless copper tubes expanded into full fin collars for permanent fin-tube bond and use highly efficient Trane Delta Flo, Type H aluminum fins mechanically bonded. 3, 4 and 6 row coils are available with 12 fins per inch fin spacing. Coils have round, seamless, copper pipe liquid lines and suction headers with male sweat connections. Suction headers have bottom connections to aid drainage of any oil that may collect in the coil. Liquid line and suction connections are outside the unit casing (on the same side of the unit) to facilitate field piping. . Coils are dehydrated and sealed with a dry air charge. Connections are clearly labeled to ensure coils are piped correctly. Coils are proof tested at 715.00 psi and leak tested at 650.00 psi air-under-water. Max std operating conditions are 650.00 psi at 127.0 F with R410a. Coil performance data is in accordance with the current edition of AHRI Standard 410.

Unit Fan
The fans are DWDI (double width double inlet) forward curved centrifugal blower type. The fans are direct drive mounted directly to the motor shaft. All fans are dynamically balanced. All air handlers have a single fan.

Electronically Commutated Motors (ECM) - Three Phase
All motors are brushless DC (BLDC) electronically commutated motors (ECM) factory programmed and run tested in assembled units. The motor controller is mounted in a control box with a built in integrated user interface and LED tachometer. If adjustments are needed, motor parameters can be adjusted through momentary contact switches accessible without factory service personnel on the motor control board. Motors will soft ramp between speeds to lessen the acoustics due to sudden speed changes. Motors can be operated at three speeds or at variable speed with factory supplied or field supplied controllers. The motor will choose the highest speed if there are simultaneous or conflicting speed requests. All motors have integral overload protection with a maximum ambient operating temperature of 130.0 F and use permanently sealed ball bearings. Motors can operate at plus or minus 10 percent of rated voltage on all speed settings.

2" Pleated Throw-Away Merv8 Filter
The units are equipped with 2" flat pleated media filters with a rated average dust spot efficiency of no less than 35 to 40 percent when tested in accordance with ASHRAE 52.1 atmospheric dust spot method and a Merv8 rating based on ASHRAE Standard 52.2.

Stainless Steel Drain Pan
The drain pan is noncorrosive and double-sloped to allow condensate drainage. The drainpan construction is stainless steel. Coils mount above the drain pan, not in the drain pan - thus allowing the drain pan to be fully inspected and cleaned. The drain pan can also be removed for cleaning. The drain pan connections are 3/4" NPT schedule 40 stainless steel pipe. The main drain connection is at the lowest point of the drain pan. An auxiliary drain connection is provided on the same side as the main connection.

Customer Supplied Terminal Interface (CSTI)
The customer supplied terminal interface (CSTI) is a pre-wired control offering of selected control components. This option intended to be used with a field-supplied, low-voltage thermostat or controller and field supplied temperature sensors. The control box contains a relay board which includes a line voltage to 24-volt transformer and disconnect switch (for non-electric heat units). Selected components are wired to a low-voltage terminal block and are run-tested, so the only a power connection and thermostat/controller connection are needed to commission the unit.

Condensate Overflow Sensor
This option provides an output that indicates when the drain pan is in danger of overflowing with condensate. This condition is indicated when the float switch rises to 50% of its travel and the normally closed output opens. The float switch is factory-wired to a terminal block for connection to a field supplied controller. When wired to the CSTI, the switch does not de-energize the unit when open position occurs. This is a dry contact only and sequence of operation of unit when this condition is reached is the responsibility of the field provided controller or thermostat.

Dimensional Drawings - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

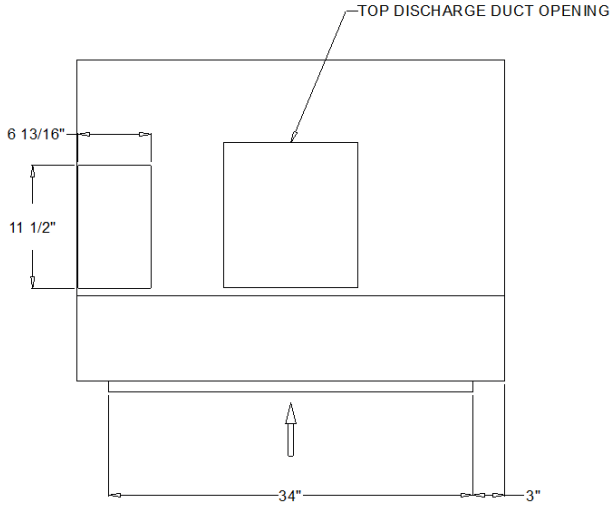
NOTES:

1. ACCESS PANELS ARE LOCATED ON BOTH SIDES OF THE UNIT TO PROVIDE ACCESS TO THE UNIT'S INTERNAL COMPONENTS.

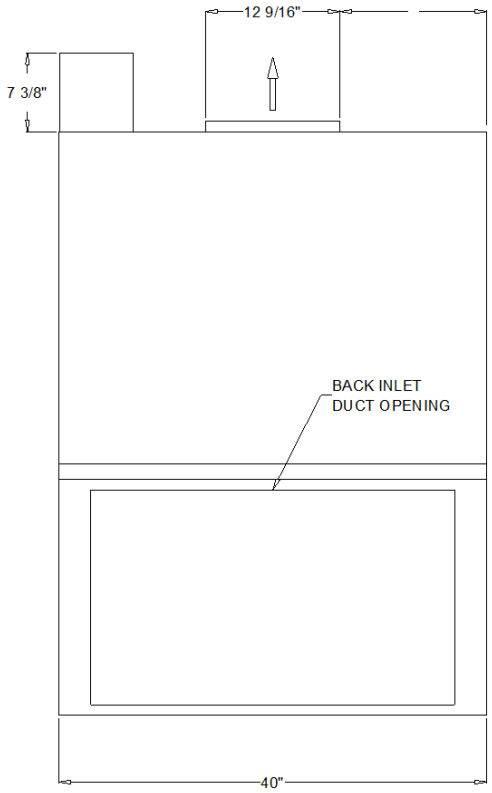
2. CONTROL BOX IS FACTORY MOUNTED ON DRIVE SIDE AND PROVIDED WITH 7/8" DIAMETER KNOCKOUTS FOR FIELD WIRING.

3. ARROWS INDICATE THE DIRECTION OF AIRFLOW.

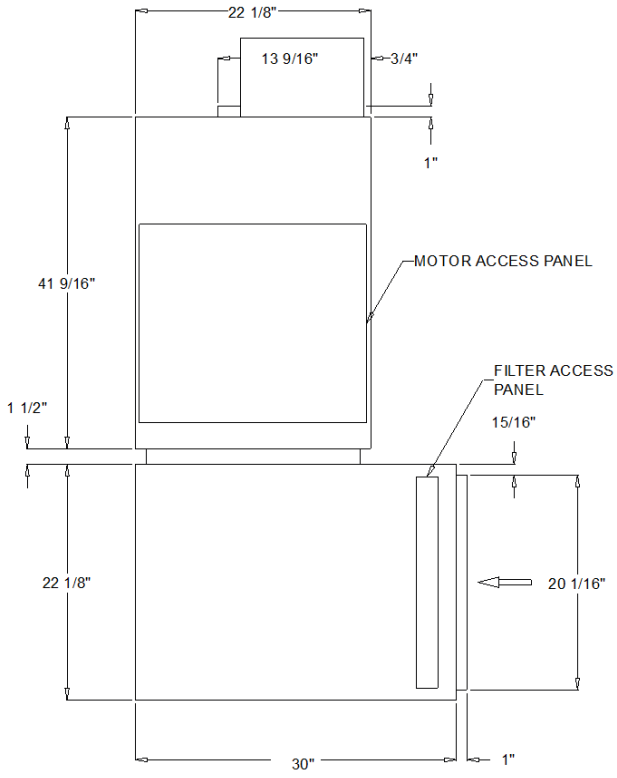
4. VERTICAL UNIT SHIPS IN TWO PIECES AND REQUIRES FIELD ASSEMBLY.



TOP VIEW

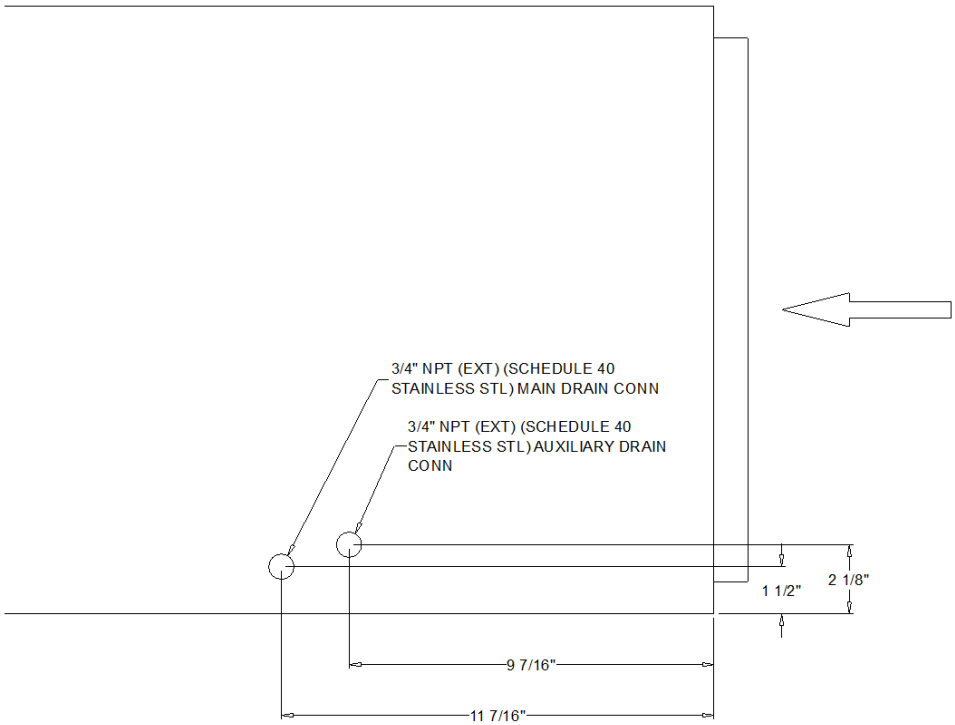


BACK VIEW



RIGHT VIEW

Dimensional Drawings - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1



RIGHT VIEW

NOTES:
1. ALL DIMENSIONS ARE SHOWN FROM THE BOTTOM REAR CORNER OF UNIT.
2. STUBOUTS PROTRUDE 2 1/8" FROM EXTERIOR CASING OF UNIT.
3. ARROW INDICATES THE DIRECTION OF AIRFLOW.

Dimensional Drawings - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

NOTES:

1. WEIGHT OF BASIC UNIT INCLUDES ONLY CABINET, FAN, AVERAGE DRIVE, WIRING AND AVERAGE FILTER.

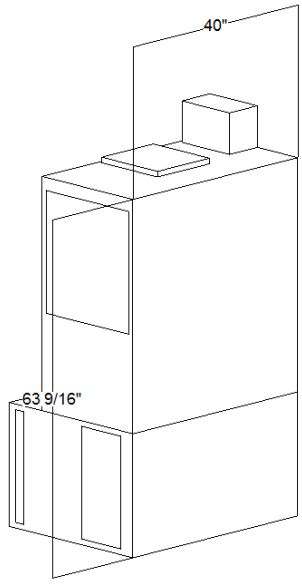
2. WEIGHT OF STEAM COIL MODULE INCLUDES ONLY CABINET WITH AVERAGE FILTER.

3. BEFORE PREPARING ANY UNIT OR ACCESSORY MODULE FOR LIFTING, ESTIMATE THE APPROXIMATE CENTER OF GRAVITY AND TEST LIFT THE UNIT OR ACCESSORY MODULE TO DETERMINE BALANCE AND STABILITY. USE A PROPER RIGGING METHOD SUCH AS STRAPS, SLINGS OR SPREADER BARS FOR PROTECTION AND SAFETY BEFORE HOISTING THE UNIT OR ACCESSORY MODULE.

4. DO NOT LIFT UNITS OR ACCESSORY MODULES IN WINDY CONDITIONS OR ABOVE INSTALLATION PERSONNEL. FAILURE TO PROPERLY LIFT UNIT OR ACCESSORY MODULE COULD RESULT IN DEATH, SERIOUS INJURY, EQUIPMENT DAMAGE OR PROPERTY-ONLY DAMAGE.

5. DO NOT RIG OR LIFT UNITS OR ACCESSORY MODULES WITH FORK LIFT FORKS.

6. ASSEMBLY OF THE UNIT MUST BE PERFORMED AT THE INSTALLATION SITE. ALWAYS RIG UNITS AND ACCESSORY MODULES AS SHIPPED FROM THE FACTORY.



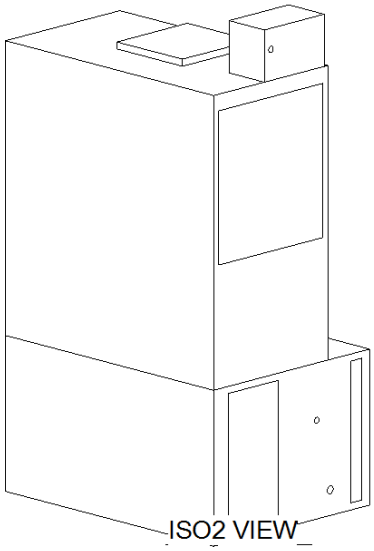
ISO1 VIEW

UNIT, COIL & ACCESSORY MODULE WEIGHTS									
BASIC UNIT	COIL 1 DRY	COIL 1 WET	COIL 2 DRY	COIL 2 WET	MOTOR	ELECTRIC HEATER	MIXING BOX	ANGLED FILTER BOX	ANGLED FILTER MIXING BOX
197.0 lb	52.4 lb				56.0 lb				

FILTER ACCESS MODULE	STEAM COIL MODULE	Control Box
		7.0 lb

STEAM COIL DRY	STEAM COIL WET

UNIT SIZE	SERVICE CLEARANCE
54	37"



ISO2 VIEW

Dimensional Drawings - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

NOTES:

ALL DIMENSIONS ARE IN INCHES

ALL COIL CONNECTIONS ARE SWEAT STYLE. WEIGHT OF BASIC UNIT INCLUDES CABINET, FAN, WIRING AND AVERAGE FILTER.

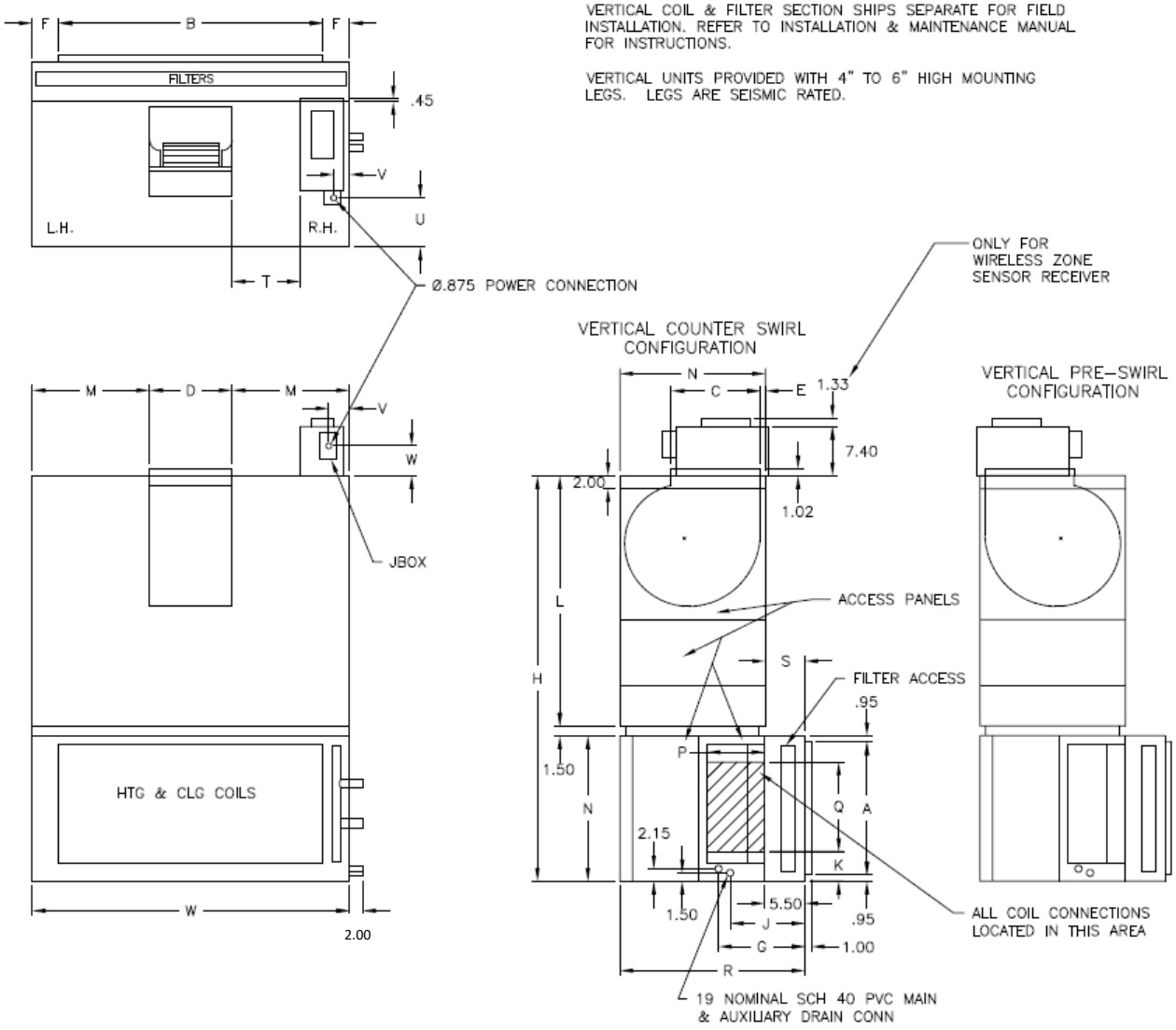
ADD TO BASIC UNIT WEIGHT, 7 LBS FOR WEIGHT OF CONTROL BOX.

CONTROL BOX FACTORY MOUNTED ON MOTOR SIDE.

VERTICAL COIL & FILTER SECTION SHIPS SEPARATE FOR FIELD INSTALLATION. REFER TO INSTALLATION & MAINTENANCE MANUAL FOR INSTRUCTIONS.

VERTICAL UNITS PROVIDED WITH 4" TO 6" HIGH MOUNTING LEGS. LEGS ARE SEISMIC RATED.

VERTICAL NON–ELECTRIC HEAT BLOWER COIL



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54	63.57	40.00	40.07	20.09	34.00	13.58	12.57	0.72	3.00	11.42	13.42	9.42	11.42
72	63.57	48.00	40.07	20.09	40.00	13.58	12.57	0.72	4.00	11.42	13.42	9.42	11.42
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UNIT SIZE	K	M	N	P	Q	R	S	T	U	V	W	BASIC UNIT WEIGHT
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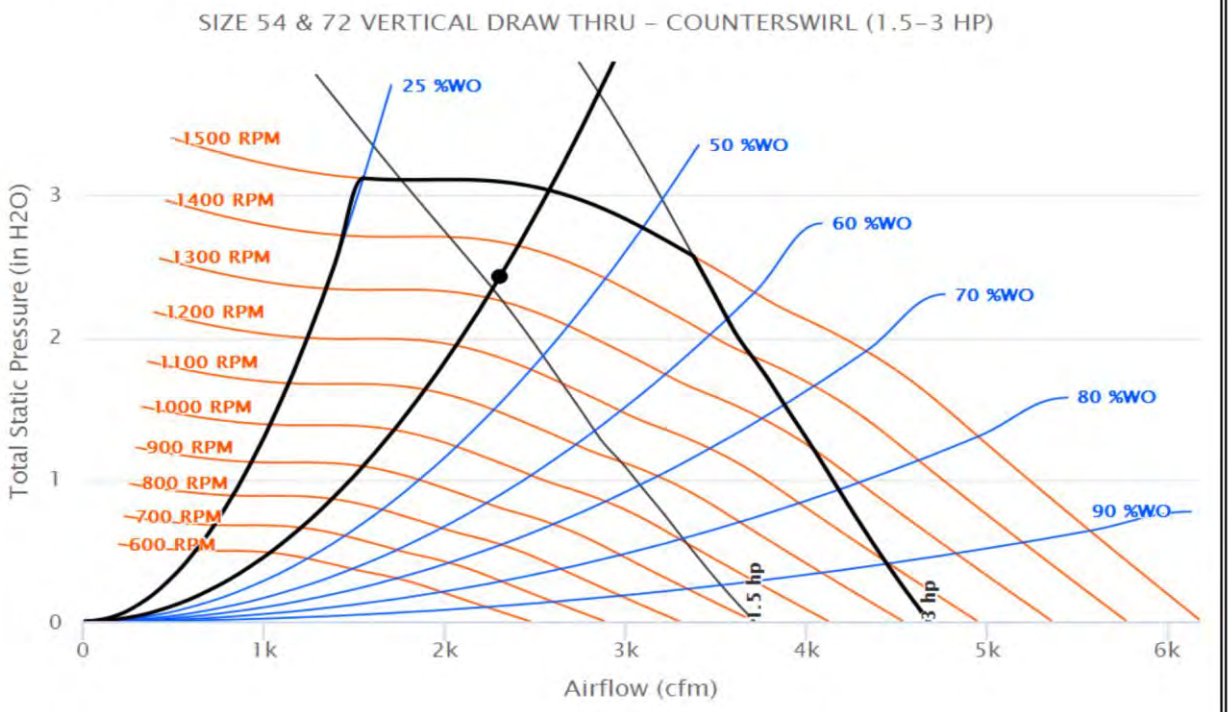
54	4.21	13.72	22.00	11.00	7.27	30.00	8.00	6.87	8.88	3.23	4.56	197.4
72	4.18	17.72	22.00	11.00	7.27	30.00	8.00	5.83	8.88	8.27	4.56	218.0
90	4.81	17.72	28.00	11.25	11.64	30.00	2.00	7.84	14.88	6.26	4.56	246.4

Fan Curve - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

Fan Details

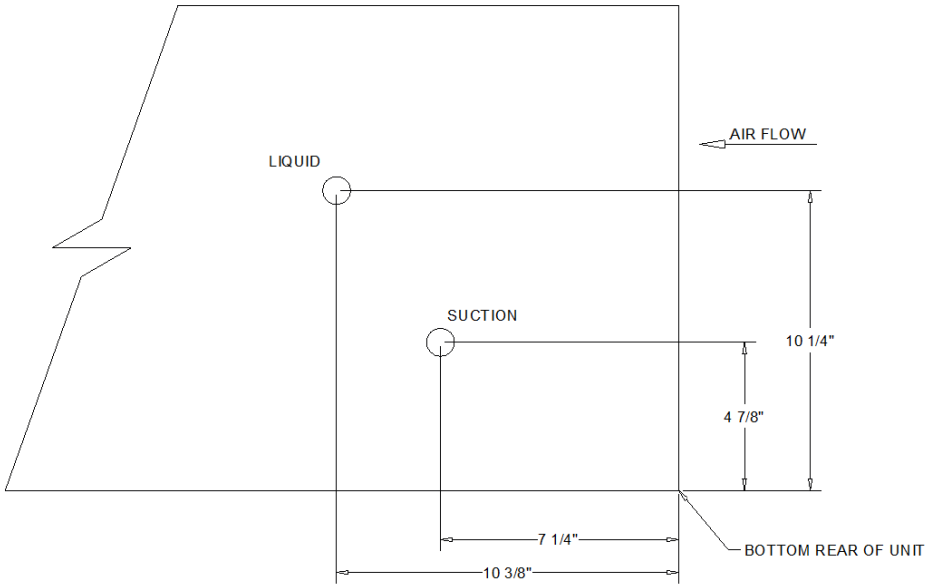
Unit Size	54	**Operating Brake Power**	1.577 hp
Operating Airflow	2,300 cfm	**Altitude**	0.00 ft
Operating Static Pressure	2.421 in H2O	**Design Temp.**	68.00 F
Operating RPM	1,341 rpm		



Accessory - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

MAIN UNIT COIL CONNECTIONS

LIQUID	7/8"
SUCTION	1 1/8"



NOTES:

1. PICTORIAL HEADER STUBOUT LOCATIONS RELATIVE TO EACH OTHER MAY NOT BE ACCURATE.

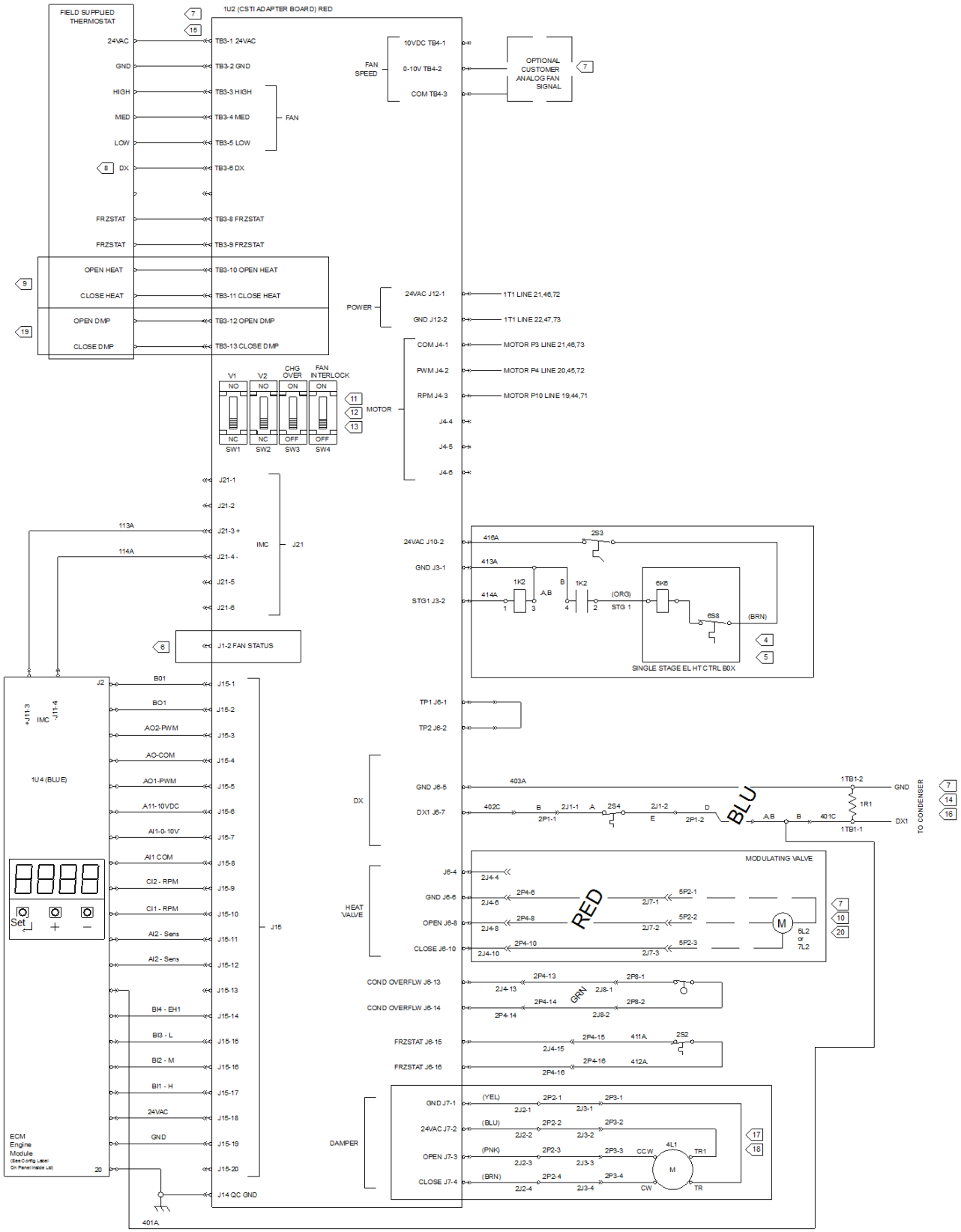
2. LOCATING DIMENSIONS HAVE A PLUS / MINUS 2" TOLERANCE.

3. FOR UNITS WITH A FILTER ACCESS MODULE, ADD 7 3/16" TO HORIZONTAL DIMENSIONS SHOWN.

4. PIPING CONNECTIONS ARE SPECIFIED AS OUTSIDE DIAMETER (O.D.).

5. THERMAL EXPANSION VALVE IS TO BE FIELD SUPPLIED FOR DX COOLING.

Field Wiring - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

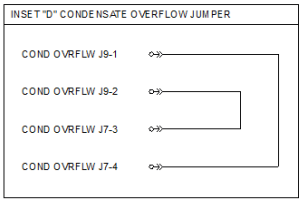


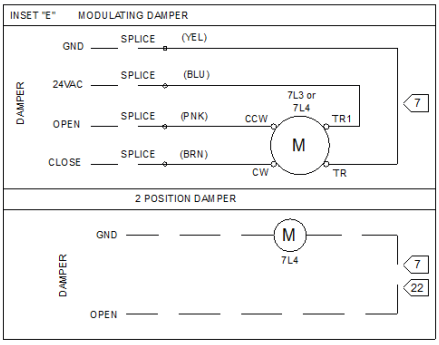
Field Wiring - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1

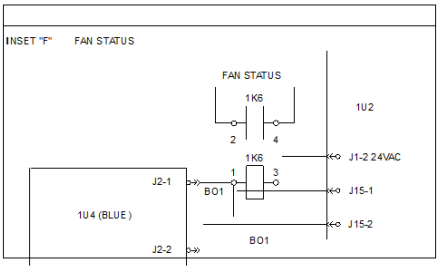
NOTES:

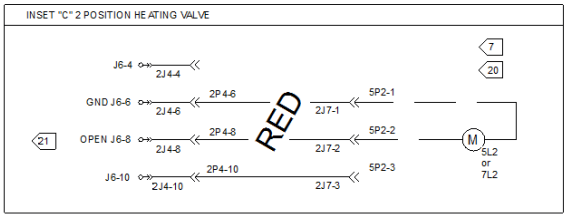
1. UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50 % RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINED ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINE ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. SOLID LINES INDICATE WIRING BY TRANE.
3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS. ALL FIELD WIRING MUST HAVE AN INSULATION VOLTAGE RATING THAT EQUALS OR EXCEEDS UNIT RATED VOLTAGE.

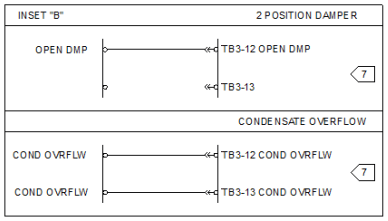
4. ELECTRIC HEAT SCHEMATIC IS LOCATED IN THE ELECTRIC HEAT CONTROL BOX PANEL.
5. WIRING SHOWN IS FOR SINGLE STAGE ELECTRIC HEAT.
6. SEE INSET "F" FOR FAN STATUS WIRING. (CTRL = N).
7. USE CLASS 2 WIRING.
8. FIELD CONNECTIONS SHOWN ON TB3-6 IS FOR SINGLE STAGE DX.
9. FIELD CONNECTIONS SHOWN ON TB3-10 AND TB3-11 ARE FOR HEATING MODULATING VALVES. FIELD INSTALLED ACTUATOR UTILIZES THE SAME CONNECTION POINTS AS FACTORY WIRING. SEE INSET "A" FOR FIELD CONNECTIONS TO HEATING TWO POSITION VALVES AND SINGLE STAGE ELECTRIC HEAT.
10. WIRING SHOWN IS FOR MODULATING VALVES. SEE INSET "C" FOR HEATING 2 POSITION VALVE SELECTIONS. FIELD SUPPLIED ACTUATOR WIRING UTILIZES THE SAME CONNECTION POINTS AS FACTORY ACTUATOR WIRING.
11. SW1 AND SW2 ARE SHOWN IN THE OFF POSITION. SW1 AND OR SW2 ARE TURNED OFF WHEN VALVES ARE NORMALLY CLOSED OR MODULATING (CVT1 OR CVT2 = A,C,E,F,G,J). SW1 AND/OR SW2 ARE TURNED ON WHEN VALVES ARE NORMALLY OPEN. (CVT1 OR CVT2 = B,D,H).
12. SW3 IS SHOWN IN THE OFF POSITION. SW3 IS TURNED ON WHEN CHANGEOVER COILS ARE SELECTED (COL1 OR COL2 = J,K,R,T).
13. SW4 IS SHOWN IN THE OFF POSITION. SW4 IS TURNED ON WHEN UNIT HAS ELECTRIC HEAT (STGE = 1,2,3).
14. WIRING SHOWN IS FOR SINGLE STAGE DX SELECTION.
15. 24V OUTPUT IS RATED 15VA
16. FIELD INSTALLED CONDENSING UNIT CAN BE WIRED BETWEEN TERMINALS 1TB1-1 TO 1TB1-2 FOR SINGLE STAGE. REMOVE RESTISTOR 1R1 PRIOR TO WIRING CONDENSOR. DX1 OUTPUTS RATED FOR 24VAC 6VA MAXIMUM.
17. WIRING SHOWN IS FOR FACTORY INSTALLED MODULATING DAMPER. SEE INSET "D" FOR CONDENSATE OVERFLOW JUMPER. SEE INSET "E" FOR 2 POSITION DAMPER AND MODULATING FIELD SUPPLIED/ SHIP LOOSE DAMPER WIRING.
18. REMOVE TEST JUMPER PRIOR TO CONNECTING MIXING BOX TO MAIN UNIT.
19. FIELD CONNECTIONS SHOWN ON TB3-12 AND TB3-13 ARE FOR MODULATING DAMPER. SEE INSET "B" FOR 2 POSITION DAMPER AND CONDENSATE OVERFLOW FIELD WIRING.
20. FIELD SUPPLIED ACTUATOR WIRING UTILIZES THE SAME CONNECTION POINTS AS FACTORY ACTUATOR WIRING.
21. VALVES SHOWN IN NORMALLY CLOSED POSITION, FOR NORMALLY OPEN POSITION, THE VALVE SIGNAL BECOMES CLOSE.
22. DAMPER SHOWN IN NORMALLY CLOSED POSITION, FOR NORMALLY OPEN POSITION, THE DAMPER SIGNAL BECOMES CLOSE.

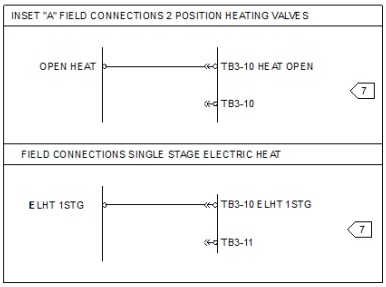








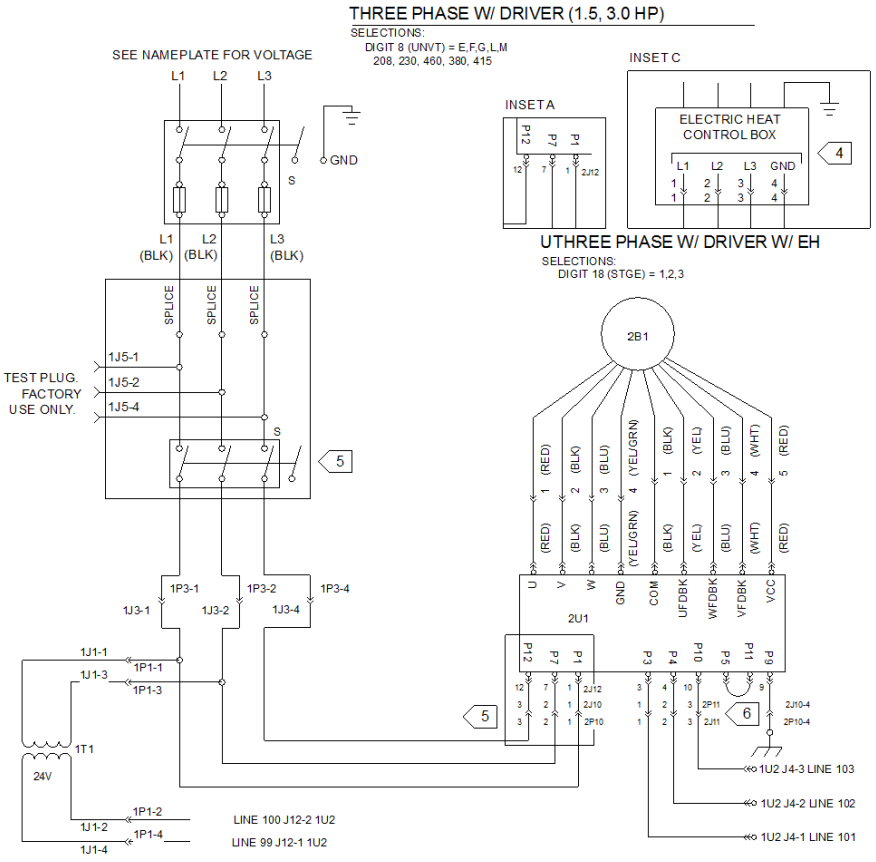




DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN AND COIL SECTION
3	
4	
5	EXTERNAL PIPING
6	ELECTRIC HEAT CONTROL BOX
7	FIELD INSTALLED DEVICE

LEGEND		
DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
1U2	ADAPTER BOARD	88,80
1U4	ENGINE BOARD	83,114
2S3	EL HT LOCKOUT SWITCH	109
6K6	CONTACTOR; EL HT STG 1	111
6S8	EL HT HIGH TEMP	112
1K2	CONTACTOR; EL HT	111
1K6	RELAY; FAN STATUS	80,83
5L2	HEATING COIL VALVE MOTOR	98,123
7L2	HEATING COIL VALVE MOTOR	98,123
2S1	CONDENSATE OVERFLOW SWTCH	126
2S2	FREEZESTAT	128
1R1	RESISTOR; DX STG 1 TEST	118
2S4	FROSTSTAT	119
7L3	MIXING BOX DAMPER ACTUATOR	111
7L4	OUTSIDE AIR DAMPER ACTUATOR	111,114
4L1	MIXING BOX DAMPER ACTUATOR	133

Field Wiring - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1



⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS AND FOLLOW LOCK OUT AND TAG PROCEDURES BEFORE SERVICING. INSURE THAT ALL MOTOR CAPACITORS HAVE DISCHARGED STORED VOLTAGE. UNITS WITH VARIABLE SPEED DRIVE, REFER TO DRIVE INSTRUCTIONS FOR CAPACITOR DISCHARGE.

FAILURE TO DO THE ABOVE BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ AVERTISSEMENT

TENSION DANGEREUSE!

COUPER TOUTES LES TENSIONS ET OUVRIR LES SECTIONNEURS À DISTANCE. PUIS SUIVRE LES PROCÉDURES DE VERROUILLAGE ET DES ÉTIQUETTES AVANT TOUTE INTERVENTION. VÉRIFIER QUE TOUS LES CONDENSATEURS DES MOTEURS SONT DÉCHARGÉS. DANS LE CAS D'UNITÉS COMPORTANT DES ENTRAÎNEMENTS À VITESSE VARIABLE, SE REPORTER AUX INSTRUCTIONS DE L'ENTRAÎNEMENT POUR DÉCHARGER LES CONDENSATEURS.

NE PAS RESPECTER CES MESURES DE PRÉCAUTION PEUT ENTRAÎNER DES BLESSURES GRAVES POUVANT ÊTRE MORTELLES.

⚠ ADVERTENCIA

¡VOLTAJE PELIGROSO!

DESCONECTE TODA LA ENERGÍA ELÉCTRICA, INCLUSO LAS DESCONEXIONES REMOTAS Y SIGA LOS PROCEDIMIENTOS DE CIERRE Y ETIQUETADO ANTES DE PROCEDER AL SERVICIO. ASEGÚRESE DE QUE TODOS LOS CAPACITORES DEL MOTOR HAYAN DESCARGADO EL VOLTAJE ALMACENADO. PARA LAS UNIDADES CON EJE DE DIRECCIÓN DE VELOCIDAD VARIABLE, CONSULTE LAS INSTRUCCIONES PARA LA DESCARGA DEL CONDENSADOR.

EL NO REALIZAR LO ANTERIORMENTE INDICADO, PODRÍA OCASIONAR LA MUERTE O SERIAS LESIONES PERSONALES.

NOTICE

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO THE ABOVE COULD RESULT IN EQUIPMENT DAMAGE.

AVIS

N'UTILISER QUE DES CONDUCTEURS EN CUIVRE!

LES BORNES DE L'UNITÉ NE SONT PAS CONÇUES POUR RECEVOIR D'AUTRES TYPES DE CONDUCTEURS.

FAIRE DÉFAUT À LA PROCÉDURE CI-DESSUS PEUT ENTRAÎNER DES DOMMAGES À L'ÉQUIPEMENT.

AVISO

¡UTILICE ÚNICAMENTE CONDUCTORES DE COBRE!

LAS TERMINALES DE LA UNIDAD NO ESTÁN DISEÑADAS PARA ACEPTAR OTROS TIPOS DE CONDUCTORES.

NO SEGUIR LAS INSTRUCCIONES ANTERIORES PUEDE PROVOCAR DAÑOS EN EL EQUIPO.

NOTES:

1. UNLESS OTHERWISE NOTED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50 % RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF, AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.

2. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS. DASHED LINE ENCLOSURES AND/OR DASHED DEVICE OUTLINES INDICATE COMPONENTS PROVIDED BY THE FIELD. PHANTOM LINED ENCLOSURES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. SOLID LINES INDICATE WIRING BY TRANE CO.

3. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE (NEC), STATE AND LOCAL REQUIREMENTS.

4 ELECTRIC HEAT SCHEMATIC IS LOCATED IN THE ELECTRIC HEAT CONTROL BOX PANEL.

5 WIRING SHOWN IS FOR NO ELECTRIC HEAT. FOR ELECTRIC HEAT SINGLE PHASE SEE INSET A&B. FOR ELECTRIC HEAT THREE PHASE SEE INSET A&C.

6 CW JUMPER IS PRESENT FROM PIN P5 TO P11 ON UNITS WITH CW MOTOR ROTATION AS VIEWED FROM SHAFT END.

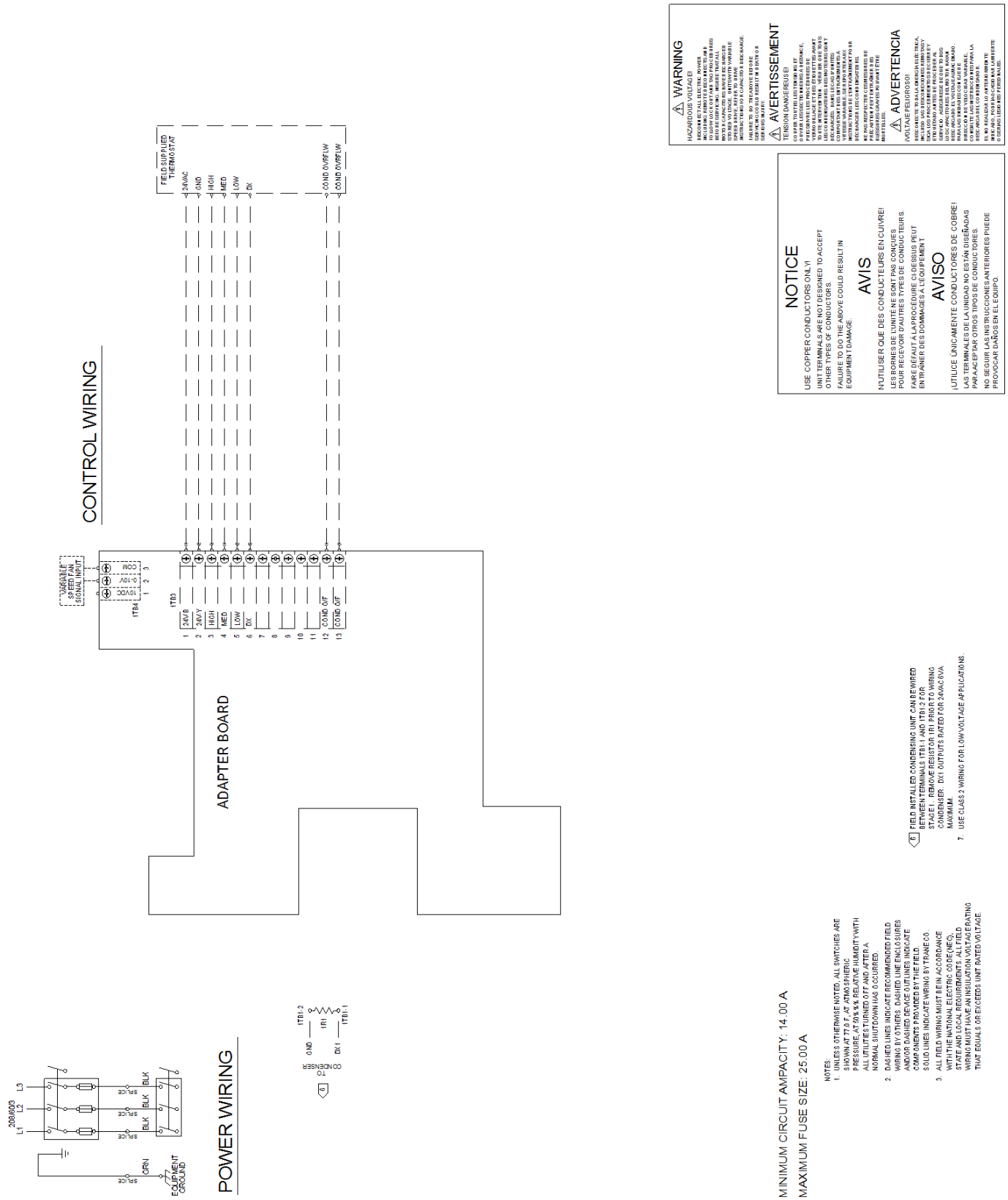
7 MOTOR VOLTAGE CONFIGURATION P2-P8 JUMPERED FOR 115V OPERATION ONLY.

8 USE COPPER CONDUCTORS ONLY.

LEGEND		
DEVICE DESIGNATION	DESCRIPTION	LINE NUMBER
SINGLE PHASE		
7S2	FUSED DISCONNECT SWITCH	3
1S1	MANUAL DISCONNECT SWITCH	12
1T1	TRANSFORMER	20
2B1	FAN MOTOR	14
THREE PHASE (0.5, 1 HP)		
7S2	FUSED DISCONNECT SWITCH	29
1S1	MANUAL DISCONNECT SWITCH	40
1T1	TRANSFORMER	48
2B1	FAN MOTOR	41

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	MAIN CONTROL PANEL
2	SUPPLY FAN AND COIL SECTION
3	
4	
5	EXTERNAL PIPING
6	ELECTRIC HEAT CONTROL BOX
7	FIELD INSTALLED DEVICE

Field Wiring - BCXD Blower Coil - Direct Drive
Item: A1 Qty: 1 Tag(s): AHU-1



Tag Data - Split System Air Conditioning Units (Small) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
B1	CU-1	1	3.5 Ton Unitary Condensing Unit	4TTR4042L1

Product Data - Split System Air Conditioning Units (Small)
Item: B1 Qty: 1 Tag(s): CU-1

Split System Cooling Outdoor Unit
3.5 Ton Nominal Cooling Capacity
200 - 230 Volt 1 Phase 60 Hertz
RAWAL capacity control valve (Field Installed)
Anti-corrosion coating on condenser coil

Mechanical Specifications - Split System Air Conditioning Units (Small)
Item: B1 Qty: 1 Tag(s): CU-1

4TTR4 - General
The Outdoor Units are fully charged from the factory for up to 15 feet of piping. This unit is designed to operate at outdoor ambient temperatures as high as 115F. Cooling capacities are matched with a wide selection of air handlers and furnace coils that are AHRI certified. The unit is certified to UL 1995. Exterior is designed for outdoor application.

4TTR4 - Casing
Unit casing is constructed of heavy gauge, G60 galvanized steel and painted with a weather resistant powder paint on all louvered panels and prepaint on all other panels. Corrosion and weatherproof CMBP-G30 base.

4TTR4 - Refrigerant Controls
Refrigeration system controls include condenser fan, compressor contactor and high pressure switch. High and low pressure controls are inherent to the compressor. A factory supplied liquid line drier is standard. Some models may require field installation.

4TTR4 - Compressor
The compressor features internal over temperature, pressure protection and total dipped hermetic motor. Other features include: Centrifugal oil pump and low vibration and noise.

4TTR4 - Condenser Coil
The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels.

4TTR4 - Low Ambient Cooling
As manufactured, this system has a cooling capacity to 55F. The addition of an evaporator defrost control permits operation to 40F. The addition of an evaporator defrost control with TXV permits low ambient cooling to 30F.

Dimensional Drawings - Split System Air Conditioning Units (Small)
Item: B1 Qty: 1 Tag(s): CU-1

ELECTRICAL / GENERAL DATA

GENERAL		POWER CONN.		COMPRESSOR	
Model:	4TTR4042	Minimum Circuit Ampacity:	22.0	Number:	1
Voltage:	208 - 230	Maximum Circuit Breaker:	35.0	Phase:	1
Unit Hertz:	60	Minimum Protection Rating:	35.0	Rated Load Amps:	16.7
Unit Phase:	1			Locked Rotor Amps:	109.0

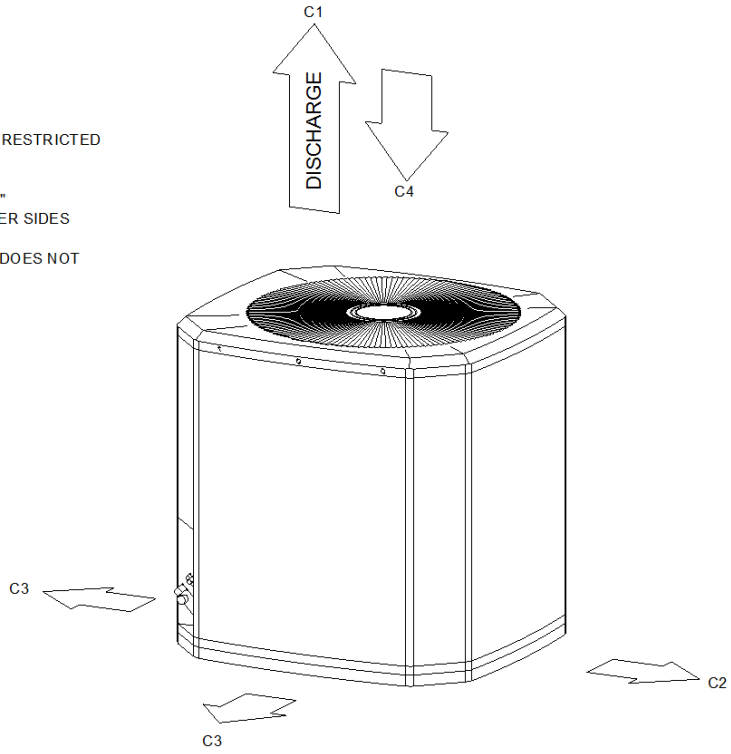
OUTDOOR MOTOR	
Number:	1
Horsepower:	0.20
Motor Speed (RPM):	-
Phase:	1
Full Load Amps:	0.93
Locked Rotor Amps:	-

REFRIGERANT	
Type:	R-410
Charge:	6.4 lb
Line Size O.D. Gas:	7/8"
Line Size O.D. LIQ:	3/8"

NOTES:
1. Certified in accordance with the Unitary Air-Conditioner equipment certification program which is based on AHRI Standard 210/240.
2. Calculated in accordance with N.E.C. Use only HACR circuit breakers or fuses.
3. Standard line lengths - 60'. Standard lift - 60' Suction and Liquid line.
   For Greater lengths and lifts refer to refrigerant piping software Pub# 32-3312-0
4. * = 15, 20, 25, 30, 40 and 50 foot lineset available.

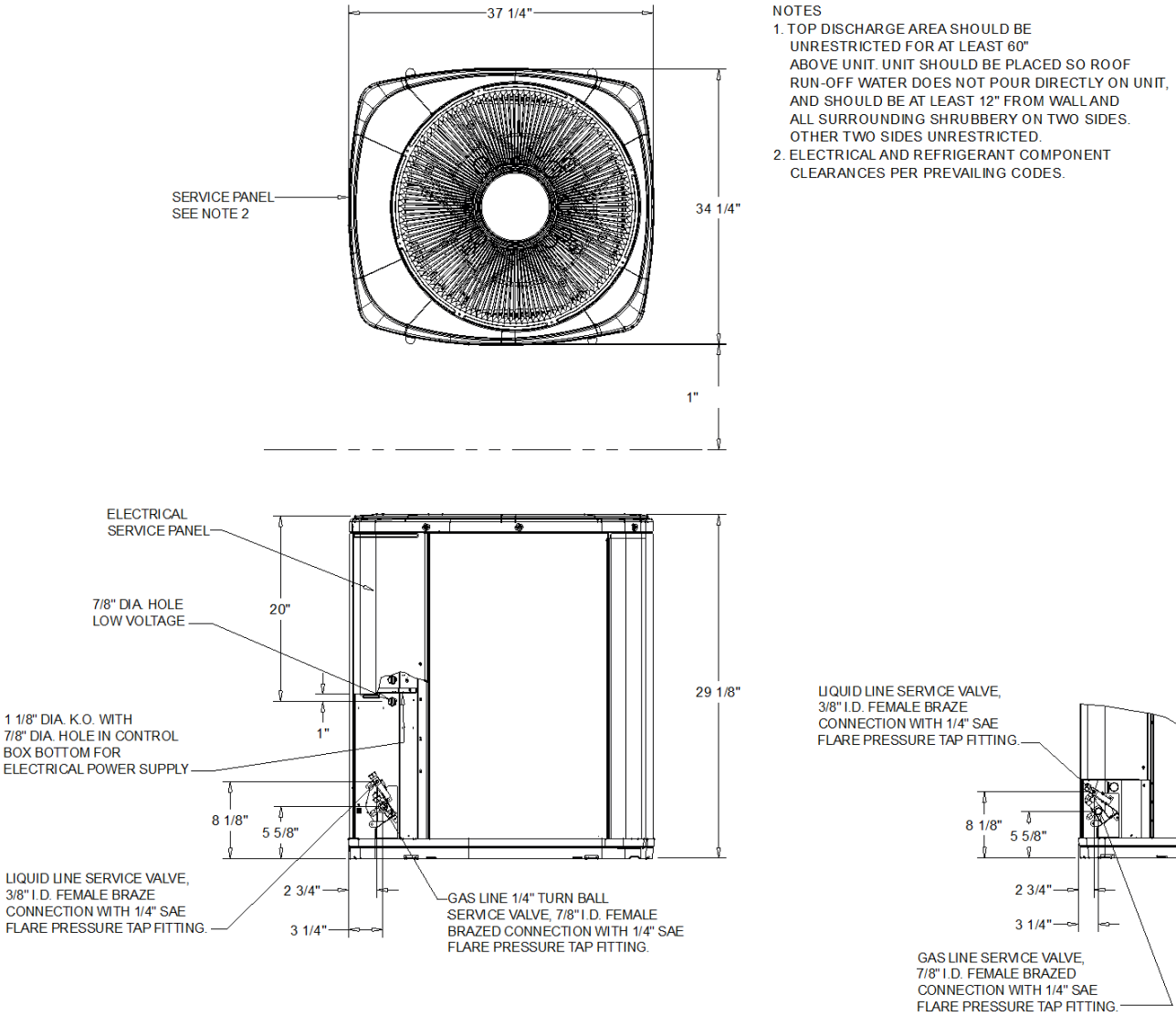
WEIGHT	
NET	184.0 lb
SHIPPING	216.0 lb

NOTES:
C1. TOP DISCHARGE SHOULD BE UNRESTRICTED FOR AT LEAST 60" ABOVE UNIT
C2. PLACE UNIT FROM WALL
C3. PLACE SHRUBBERY AT LEAST 12" FROM UNIT ON TWO SIDES, OTHER SIDES UNRESTRICTED
C4. PLACE UNIT SO ROOF RUN-OFF DOES NOT FALL DIRECTLY ON UNIT



WEIGHT AND CLEARANCE

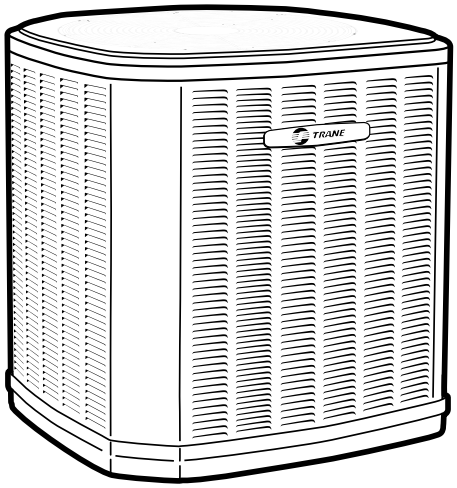
Dimensional Drawings - Split System Air Conditioning Units (Small)
Item: B1 Qty: 1 Tag(s): CU-1



Submittal

Split System Cooling

4TTR4042L1000A

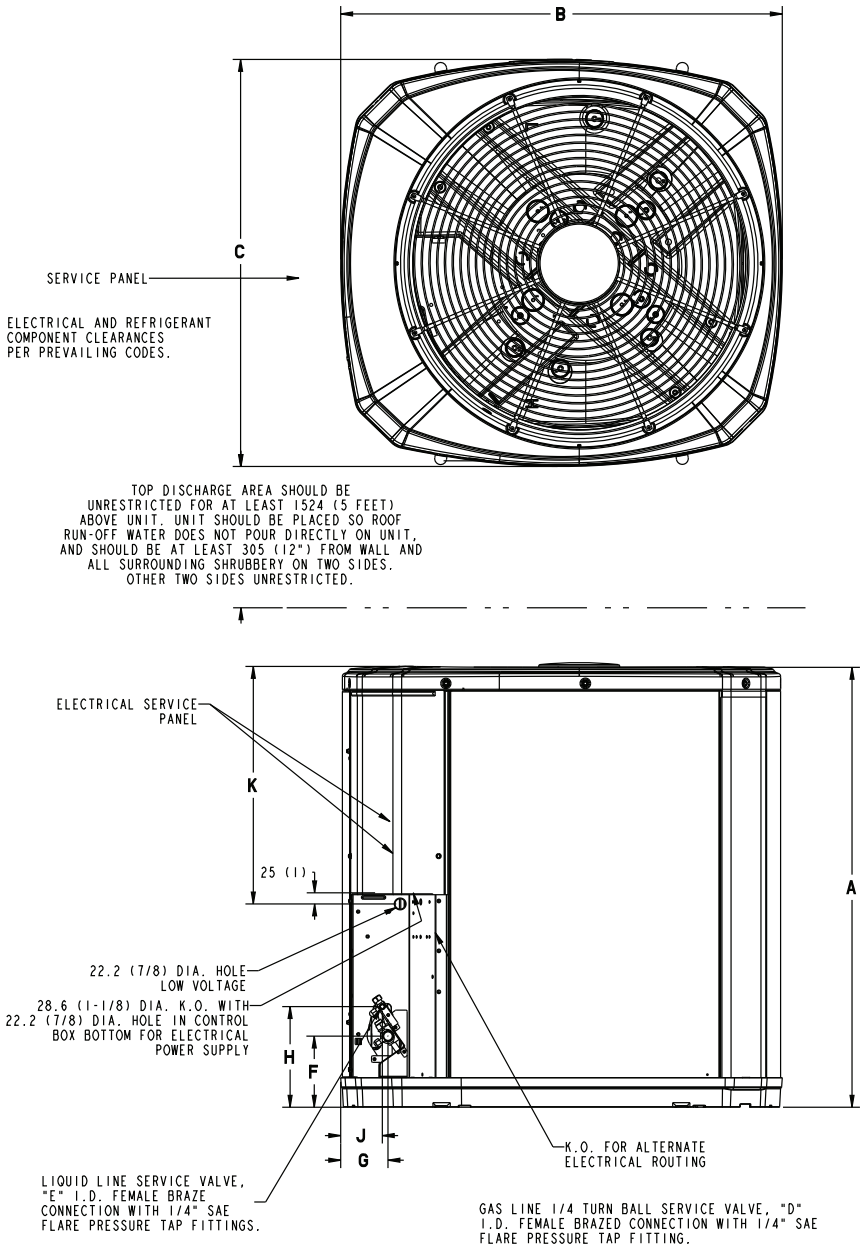


Note: *"Graphics in this document are for representation only. Actual model may differ in appearance."*

April 2020

4TTR4042L-SUB-1E-EN

TRANE TECHNOLOGIES



Model	Base	A	B	C	D	E	F	G	H	J	K
4TTR4042L	4	741 (29–1/8)	946 (37–1/4)	870 (34–1/4)	7/8	3/8	143 (5–5/8)	83 (3–1–4)	206 (8–1/8)	70 (2–3/4)	508 (20)

SOUND POWER LEVEL									
Model	A-Weighted Sound Power Level [dB(A)]	Full Octave Sound Power [dB]							
		63 Hz*	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
4TTR4042L	71	81	72	69	69	66	60	57	54
Note: Rated in accordance with AHRI Standard 270–2008 *For reference only									

Product Specifications

OUTDOOR UNIT [a] [b]	4TTR4042L1000A
POWER CONNS. — V/PH/HZ [c]	208/230/1/60
MIN. BRCH. CIR. AMPACITY	22
BR. CIR. PROT. RTG. — MAX. (AMPS)	35
COMPRESSOR	CLIMATUFF®-SCROLL
NO. USED — NO. STAGES	1 — 1
VOLTS/PH/HZ	208/230/1/60
R.L. AMPS [d] — L.R. AMPS	16.7— 109
FACTORY INSTALLED	
START COMPONENTS [e]	NO (Uses BAYKSKT263)
INSULATION/SOUND BLANKET	NO
COMPRESSOR HEAT	NO
OUTDOOR FAN	PROPELLER
DIA. (IN.) — NO. USED	27.5 — 1
TYPE DRIVE — NO. SPEEDS	DIRECT — 1
CFM @ 0.0 IN. W.G. [f]	4171
NO. MOTORS — HP	1 — 1/5
MOTOR SPEED R.P.M.	835
VOLTS/PH/HZ	200/230/1/60
F.L. AMPS	1.05
OUTDOOR COIL — TYPE	SPINE FIN™
ROWS — F.P.I.	1 — 24
FACE AREA (SQ. FT.)	19.07
TUBE SIZE (IN.)	3/8
REFRIGERANT	
LBS. — R-410A (O.D. UNIT) [g]	6 LBS., 2 OZ
FACTORY SUPPLIED	YES
LINE SIZE — IN. O.D. GAS [h]	7/8
LINE SIZE — IN. O.D. LIQ.	3/8
CHARGING SPECIFICATIONS	
SUBCOOLING	12°F
DIMENSIONS	H X W X D
CRATED (IN.)	34.4 x 35.1 x 38.7
WEIGHT	
SHIPPING (LBS.)	216
NET (LBS.)	184

[a] Certified in accordance with the Air-Source Unitary Air-conditioner Equipment certification program, which is based on AHRI standard 210/240.
[b] Rated in accordance with AHRI standard 270.
[c] Calculated in accordance with Natl. Elec. Codes. Use only HACR circuit breakers or fuses.
[d] This value shown for compressor RLA on the unit nameplate and on this specification sheet is used to compute minimum branch circuit ampacity and max. fuse size. The value shown is the branch circuit selection current.
[e] Use start components only when compressor is found to enter locked rotor condition and will not start or when lights dim at compressor start. No means no start components. Yes means quick start kit components. PTC means positive temperature coefficient starter. Optional kit shown.
[f] Standard Air — Dry Coil — Outdoor
[g] This value approximate. For more precise value see unit nameplate.
[h] Max. linear length 60 ft.; Max. lift — Suction 60 ft.; Max. lift — Liquid 60 ft. For greater length consult refrigerant piping software Pub. No. 32–3312–0* (* denotes latest revision).

Mechanical Specification Options

General

The outdoor condensing units are factory charged with the system charge required for the outdoor condensing unit, ten (10) feet of tested connecting line, and the smallest rated indoor evaporative coil match. This unit is designed to operate at outdoor ambient temperatures as high as 115°F. Cooling capacities are matched with a wide selection of air handlers and furnace coils that are AHRI certified. The unit is certified to UL 1995. Exterior is designed for outdoor application.

Casing

Unit casing is constructed of heavy gauge, galvanized steel and painted with a weather-resistant powder paint finish. The corner panels are prepainted. All panels are subjected to our 1,000 hour salt spray test.

Refrigerant Controls

Refrigeration system controls include condenser fan, compressor contactor and low and high pressure switches. A factory supplied, field installed liquid line drier is standard.

Compressor

The compressor features internal over temperature and pressure protection. Other features include: Centrifugal oil pump and low vibration and noise.

Condenser Coil

The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels.

Low Ambient Cooling

As manufactured, this system has a cooling capacity to 55°F. The addition of an evaporator defrost control permits operation to 40°F. The addition of an evaporator defrost control with TXV permits low ambient cooling to 30°F.

The addition of the BAYLOAM107A low ambient kit permits ambient cooling to 20°F.

Thermostats—Cooling only and heat/cooling (manual and automatic change over). Sub-base to match thermostat and locking thermostat cover.

Trane - by Trane Technologies (NYSE: TT), a global innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane. com or tranetechnologies.com.

The AHRI Certified mark indicates Trane U.S. Inc. participation in the AHRI Certification program. For verification of individual certified products, go to ahridirectory. org.

Trane has a policy of continuous data improvement and it reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.

4TTR4042L-SUB-1E-EN 24 Apr 2020
Supersedes 4TTR4042L-SUB-1D-EN (October 2019)

Submittal

Prepared For:
B&I Contractors

Date: February 14, 2022

Job Name:
Ft Lauderdale Fire Station 54

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	Trane Horizon Outdoor Air Unit

Andrew Miller
Trane U.S. Inc.
2884 Corporate Way
Miramar, FL 33025
Office Phone: (954) 499-6900

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Please Note:

- Contractor to review submittal for accuracy prior to equipment release.
- Roof curb to be submitted under separate cover.

Product Data - Horizon™ - Outdoor Air Unit (Revision 6)

Size	Qty	Description	Model Number
D015	1	Horizon™ - Outdoor Air Unit (Revision 6)	OADG015C1-DAB10JD00

Tag(s): ERV

Unit Voltage: 208-3-60
Warranty: 1-Year Parts Only (manufacturer warranty)
Warranty: 5-Year Digital/Variable Speed/Standard Scroll Compressor / 25-Year Heat Exchanger
Airflow Configuration: Vertical Discharge/Vertical Return
Indoor Coil Type: DX 6-Row
Reheat: Fin & Tube Modulating HGRH - Eco-Coated
Compressor: Digital Scroll-1st Circuit Only
Outdoor Coil Type: Air Cooled Fin & Tube
Heat Type - Primary: Electric - SCR Modulating
Heat Capacity - Primary: 20 kW
Supply Fan Motor Type: Direct Drive w/VFD
Exhaust Fan Motor Type: Direct Drive w/VFD
Fan Piezo Rings: Supply Fan Piezo Ring/Tap
Unit Controls: Discharge Air Control - UC600 BACnet Controller
Building Interface: BACnet
Filter Options: MERV-13, 80%
Energy Recovery: ERV-Composite Construction with Frost Protection w/ VFD
Energy Recovery Wheel Size: ERC-3622C
ERV Rotation sensor: Rotation sensor
Damper Options: Modulating OA & RA Dampers w/Economizer
Exhaust Dampers: Barometric Relief Dampers
Electrical Options: Non-Fused Disconnect
Corrosive Environment Package: Eco Coated Coils
Condenser Fan Options: Active (VFD) Head Pressure Low Ambient Control
Sound Attenuation Package: Compressor Sound Blankets
Hailguards
Installation: Outdoor
Cooling Controls: Reliatel
Condensate Overflow Switch
Supply Discharge Air Sensor (FLD)
18” tall, flat, insulated, wind load rated roof curb (FLD)
2 inch Double Wall Construction
Stainless Steel Drip Pan
Blower HP - 2
Blower RPM - 2207
Supply Fan - ANPA 14
Exhaust RPM - 1575
Exhaust HP - 1.5
Exhaust Fan - ANPA 14.6
Unit Amps - FLA: 71.3 Amps
Min Circuit Ampacity - MCA: 86.8 Amps
Maximum Fuse Size - MFS: 100 Amps

Tag: **ERV** Comments:

Unit Information

Model:	**Horizon™ (OAD/N Rev6 - OADG/OANG)**	Unit Length:	**212** in	Weight Operating:	**4129** lb*
Size:	**D015**	Unit Width:	**95** in	***Note: Weight does not include CURB weight. See CURB submittal for actual***	
Quantity:	**1**	Unit Height:	**68** in	**Refrigerant Charge**	
Supply Airflow:	**2,300** CFM	Elevation:	**0** ft	Circuit 1:	**32.5** lbs
Outside Airflow:	**2,300** CFM	Ambient Air DB:	**95** F		
Minimum Airflow:	**1,292** CFM				

Cooling Performance

Gross Total Capacity:	**182.8** MBh	Evaporator Face Area:	**10.42** sq ft
Gross Sensible Capacity:	**90.6** MBh	Evaporator Rows / FPI:	**6 / 14**
Net Total Capacity:	**179** MBh	Condenser Face Area:	**30** sq ft
Net Sensible Capacity:	**86.8** MBh	Condenser Rows / FPI :	**2 / 14**
Entering Air DB / WB (Coil):	**83.9 / 73.3** F	Air Velocity:	**220** fpm
Leaving Air DB / WB (Coil):	**48.5 / 48.1** F	Coil Air PD:	**0.28** in H2O
Leaving Air DB / WB (Reheat):	**60 / 53.17** F	EER:	**16.1**
Leaving Air DB / WB (Unit):	**61.8 / 53.9** F	Watts:	**14384**
Leaving DP:	**47.5** F	MRE:	**8.29** lb/kWh
MRC:	**119.30** lb/h		

Heating Performance

Heat Type:	**Electric Heat**		
Capacity	**20** kW	Voltage-Ph-Hz:	**208-3-60**
Entering Air DB:	**54.5** F	Coil Air PD:	**0.00** in H2O
Leaving Air DB:	**82** F		

Energy Recovery Wheel ERC-3622C

*** TAB Outside airflow through OA Intake to this value*

Summer Conditions

Ventilation Supply		Outside	
Airflow:	**2,300** CFM	Airflow:	**2,447** CFM**
DB:	**83.9** F	DB:	**91.0** F
WB:	**73.3** F	WB:	**79.0** F
PD:	**1.00** in H20		

Return		Exhaust	
Airflow:	**800** CFM	Airflow:	**947** CFM
DB:	**72.0** F	DB:	**90.8** F
WB:	**61.0** F	WB:	**78.4** F
ESP:	**1.00** in H20	ERV PD:	**0.37** in H20

Total Capacity:	**52.30** MBH		
Sensible Capacity:	**16.08** MBH	Eff.	**0.99**
Latent Capacity:	**36.22** MBH	Eff:	**0.94**

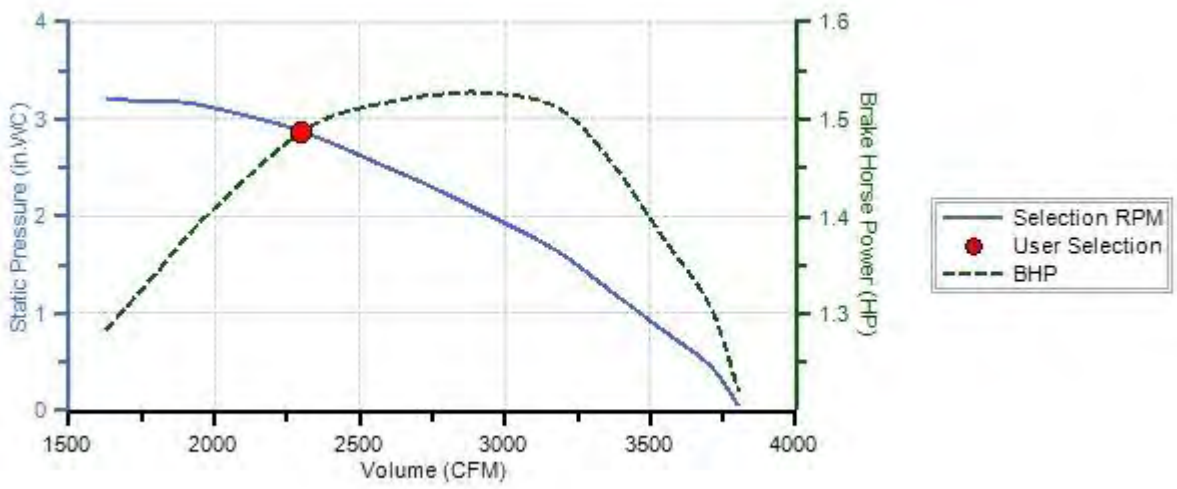
Winter Conditions

Ventilation Supply		Outside	
Airflow:	**2,300** CFM	Airflow:	**2,447** CFM**
DB:	**54.5** F	DB:	**46.0** F
WB:	**48.4** F	WB:	**45.0** F
PD:	**1.00** in H20		

Return		Exhaust	
Airflow:	**800** CFM	Airflow:	**947** CFM
DB:	**70.0** F	DB:	**46.2** F
WB:	**54.0** F	WB:	**45.0** F
ESP:	**1.00** in H20	ERV PD:	**0.37** in H20

Total Capacity:	**17.50** MBH		
Sensible Capacity:	**20.44** MBH	Eff:	**0.99**
Latent Capacity:	**2.94** MBH	Eff:	**0.94**

Supply Fan ANPA 14



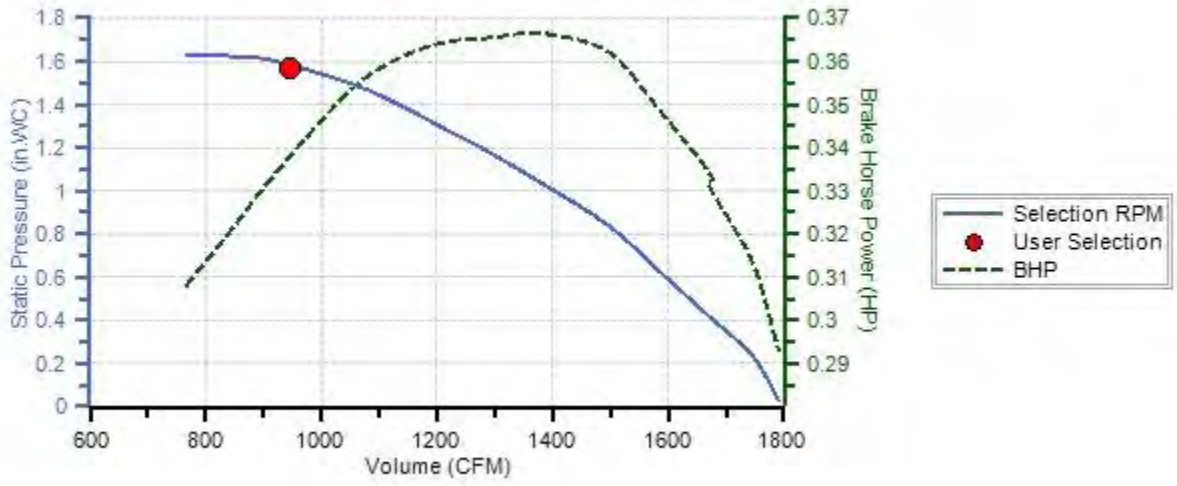
Supply Pressure Drop Summary

External Static Pressure:	**1.50** in H2O
Cooling Coil:	**0.28** in H2O
Filter:	**0.05** in H2O
HGRH:	**0.01** in H2O
ERV OA:	**1** in H2O
Outdoor:	**0.02** in H2O
Total Static Pressure:	**2.86** in H2O

Supply Fan Conditions

Fan Motor BHP:	**1.48** BHP
Operating RPM:	**2207** RPM
Minimum RPM:	**1782** RPM

Exhaust Fan ANPA 14.6



Exhaust Pressure Drop Summary

Return External Static Pressure:	**1** in H2O
ERV Return Filter PD:	**0.2** in H2O
ERV Wheel PD:	**0.37** in H2O
Total Exhaust Static Pressure	**1.57** in H2O

Exhaust Fan Conditions

Fan Motor BHP:	**0.34** BHP
Operating RPM:	**1575** RPM

Standard Radiated Sound Power Level (dBA)

63	125	250	500	1000	2000	4000	8000	Total dBA
59.7	**69.7**	**76.7**	**81.7**	**81.7**	**81.7**	**82.7**	**78.7**	**88.7**

Sound power levels are listed for informational purposes only and are not guaranteed.

Unit Electrical Data

Unit Voltage-Ph-Hz:	**208-3-60**	Min Circuit Ampacity - MCA:	**86.8** Amps
Unit Amps - FLA:	**71.3** Amps	Maximum Fuse Size - MFS:	**100.0** Amps

Electrical Summary

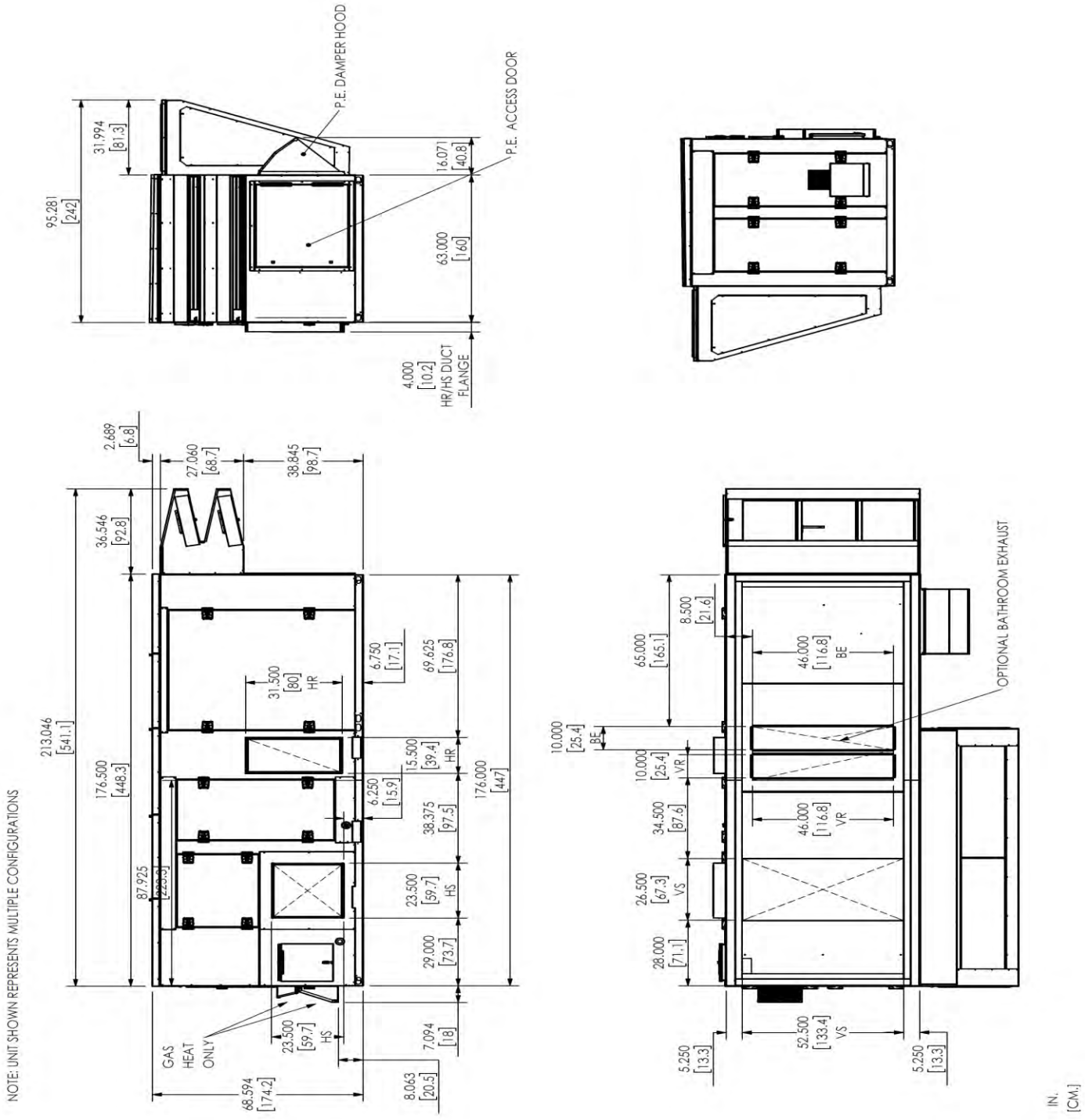
Component	Fan Service	Qty	HP (ea.)	FLA (ea.)	RLA (ea.)	LRA (ea.)
	Exhaust	**1**	**1.5**	**4.8**		
Scroll		**1**			**25**	**164**
Digital Scroll		**1**			**24**	**186.6**
	Supply	**1**	**2**	**6**		
	Condenser	**2**	**1**	**4.2**		
Controls		**1**		**2.4**		
Electric Heat		**1**		**55.5**		
ERV/HRV		**1**	**0.17**	**0.7**		

Notes

- Unit Electrical amps include the greater of compressor or electrical heat amps.
- Unit's electrical as shown above are for single point power.

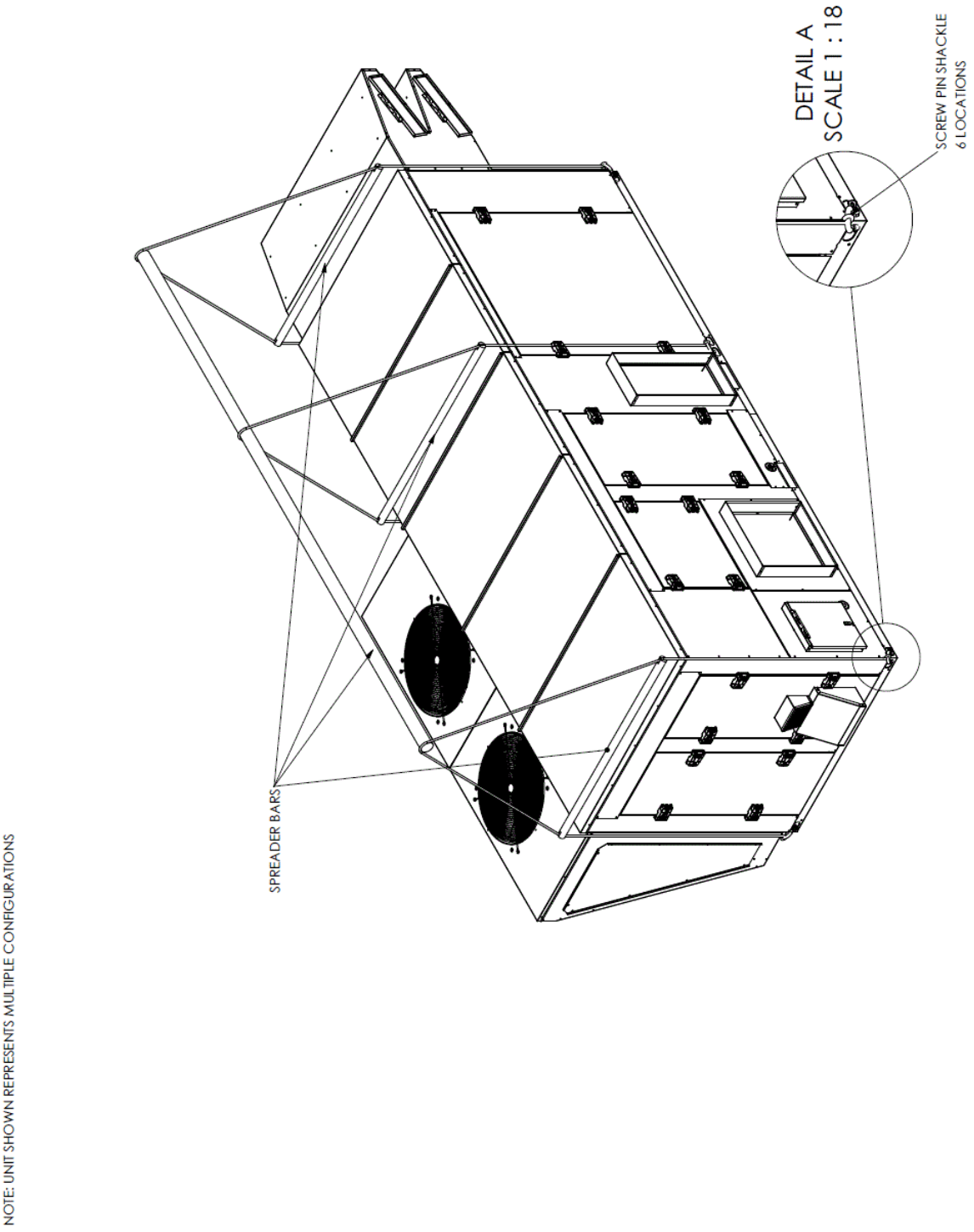
Unit Dimensions - 10-20 Ton R-410A PKGD Unitary Cooling Rooftop with Powered Exhaust and Energy Recovery Wheel

Qty: 1 Tags: ERV



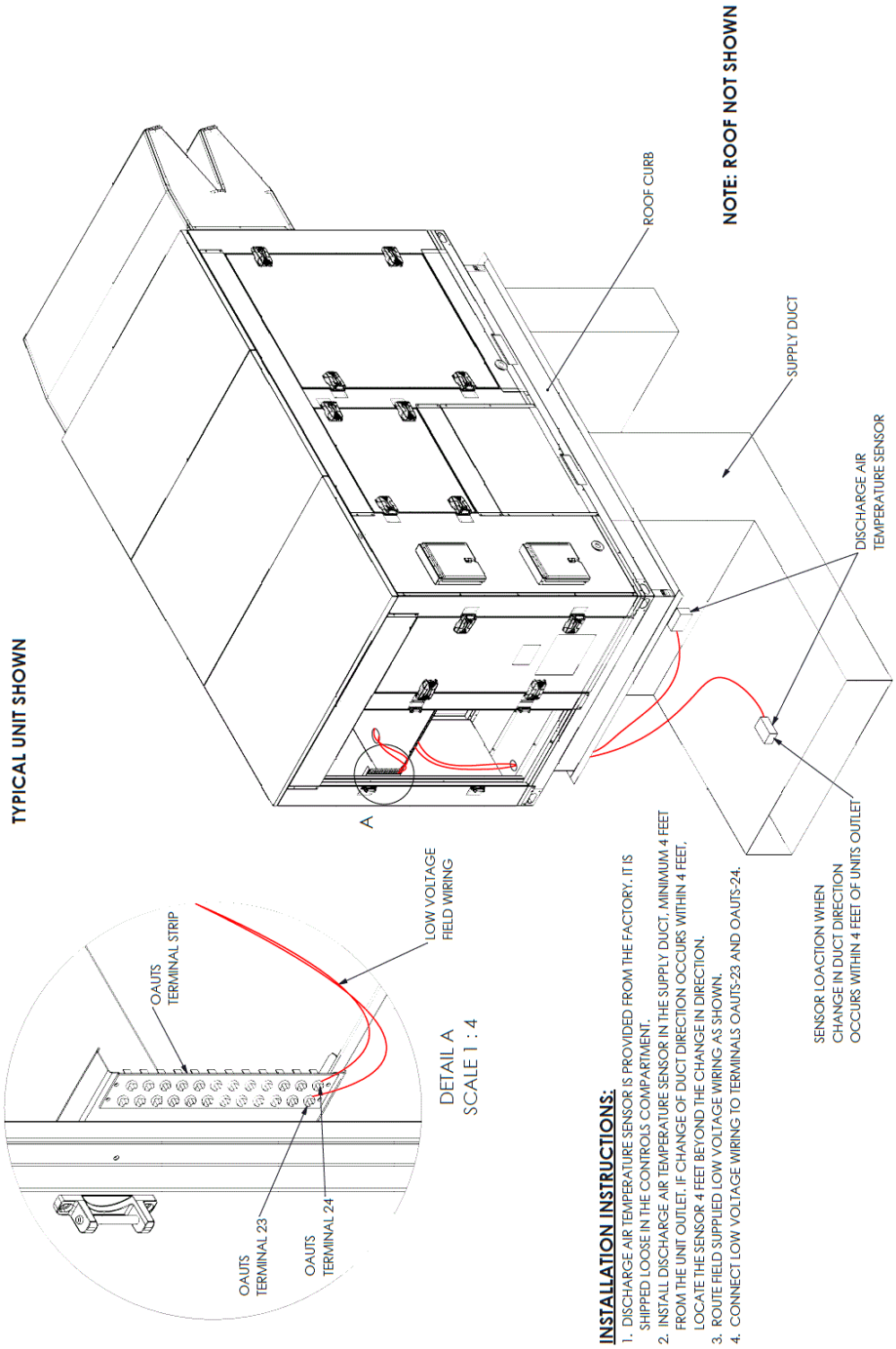
Rigging Diagram - 10-20 Ton PKGD Unitary Cooling Rooftop with Powered Exhaust and Energy Recovery

Qty: 1 Tags: ERV



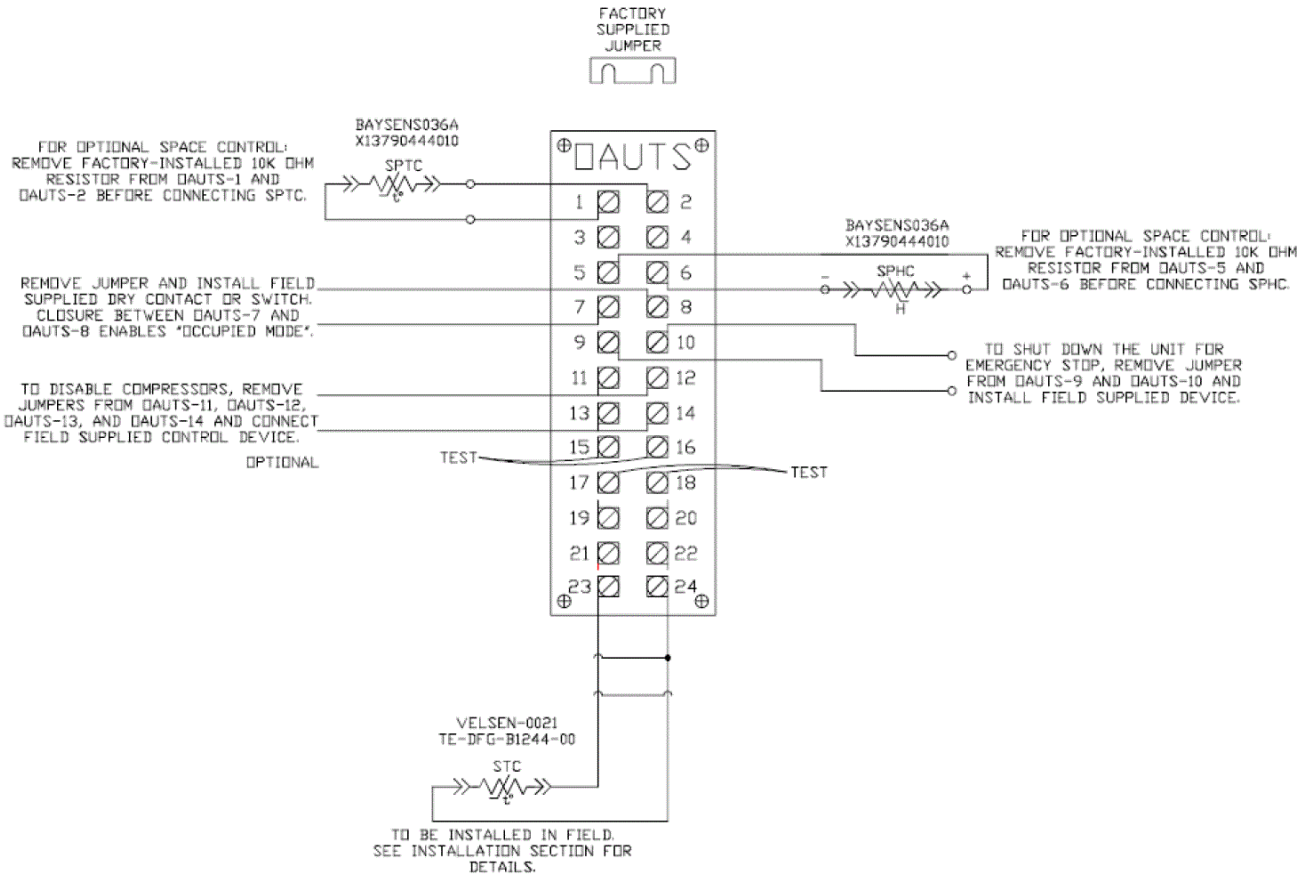
Field Wiring - 3-54 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: ERV



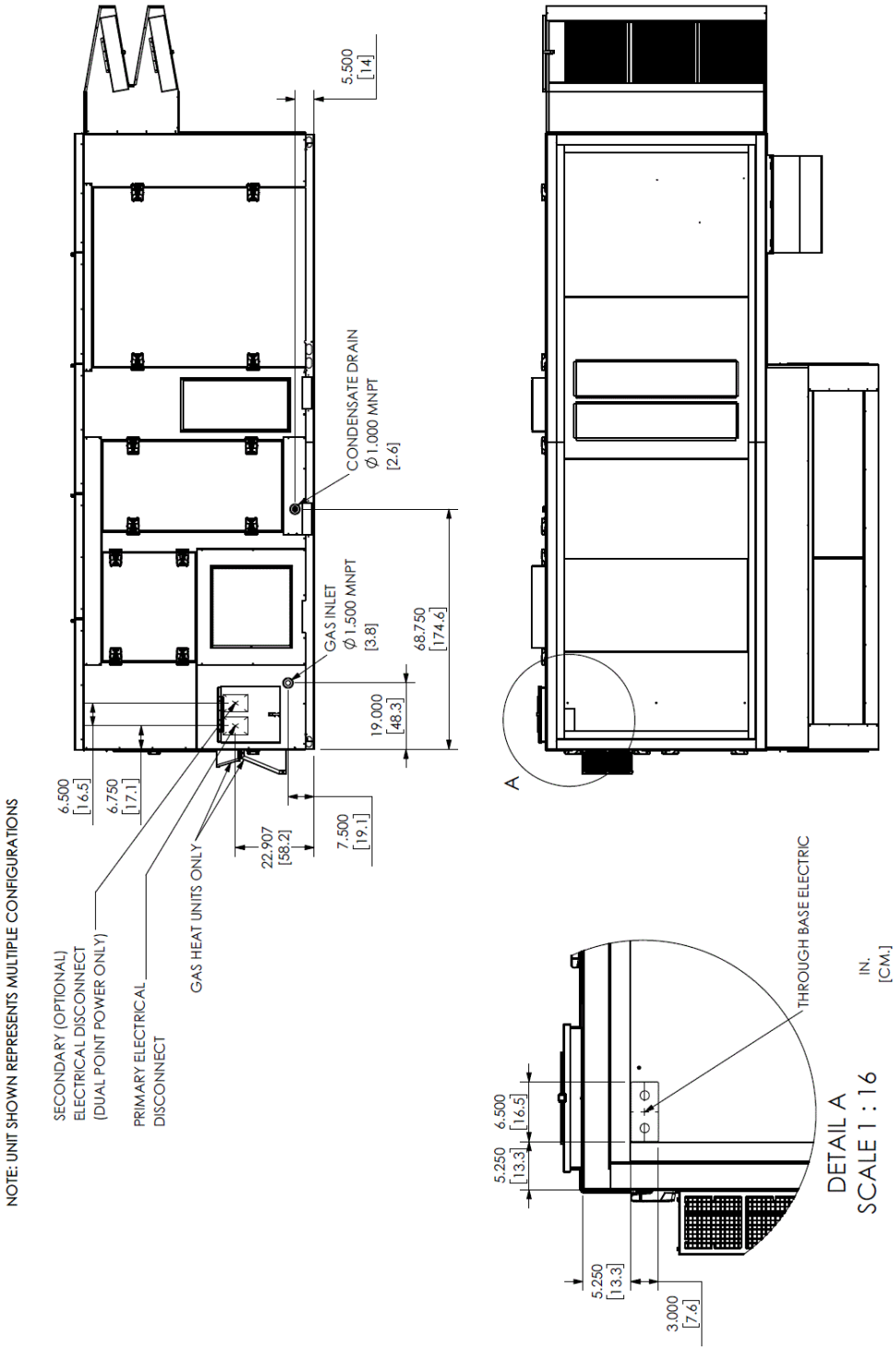
Field Wiring - 3-60 Ton T-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: ERV



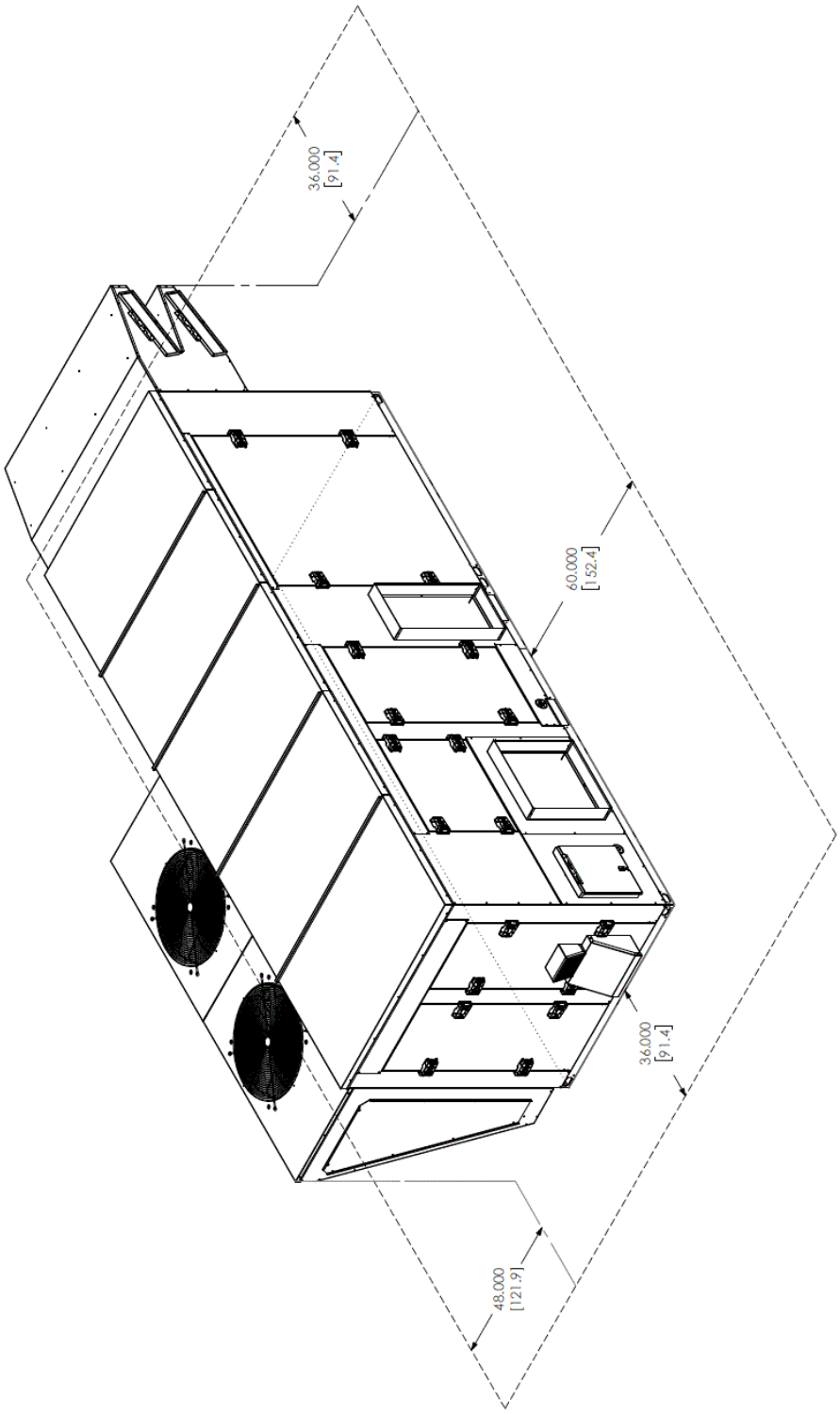
Utility Connections - 10-20 Ton R-410A PKGD Unitary Cooling Rooftop with Powered Exhaust and Energy Recovery Wheel

Qty: 1 Tags: ERV



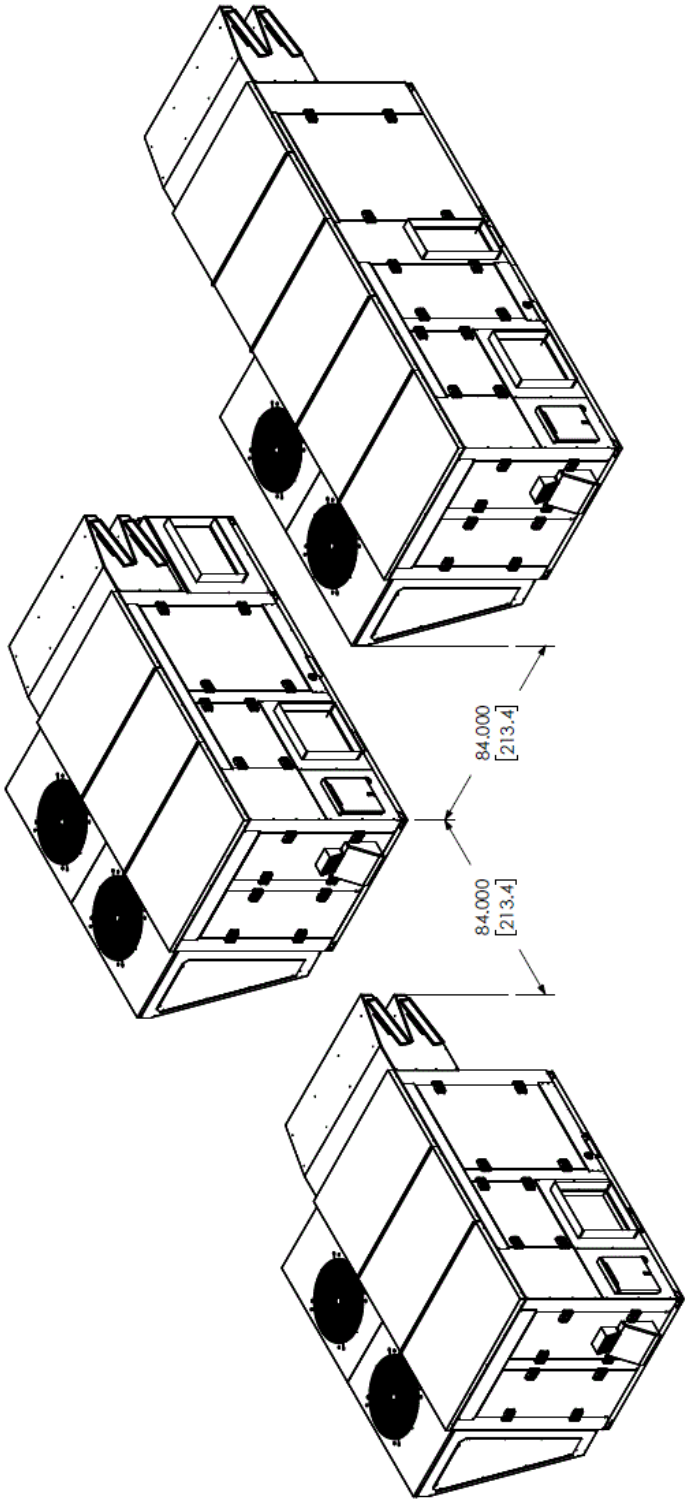
Clearance Diagrams - 10-20 Ton R-410A PKGD Unitary Cooling Rooftop with Powered Exhaust and Energy Recovery Wheel

Qty: 1 Tags: ERV



Clearance Diagrams - 10-20 Ton R-410A PKGD Unitary Cooling Rooftop

Qty: 1 Tags: ERV



NOTE: UNIT SHOWN REPRESENTS MULTIPLE CONFIGURATIONS

IN.
[CM.]

Mechanical Specifications - Tag(s): ERV

Casing

Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Unit shall have 2 inch thick Antimicrobial two component rigid polyurethane foam insulation, metal encapsulated with no exposed edges. Initial R value of 6.7 per inch of thickness. The unit's base pan shall have no penetrations within the perimeter of the curb other than the raised downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.

Unit Top

The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top

Sensors

A factory installed combination outdoor air sensor located in the outdoor air hood is designed to sense both outdoor air temperature and relative humidity for use by the microprocessor controller to make required ventilation, cooling, dehumidification and heating decisions. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes. A factory installed sensing tube is designed to sense the supply air temperature downstream of the indoor fan section.

Indoor Coil Type: DX 6-Row

Internally finned, inch copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil shall be leak tested to 500 psig and pressure tested to 500 psig. A Stainless Steel double-sloped condensate drain pan with provision for through the unit wall condensate drain is standard. Evaporator coil will have 6 interlaced rows for superior sensible and latent cooling.

Reheat: Fin & Tube Modulating HGRH - Eco-Coated

This option shall consist of a modulating hot-gas reheat coil located on the leaving air side of the evaporator coil pre-piped and circuited with a low pressure switch. Refer to the Sequence of Operations section of the Installation, Operation and Maintenance manual for detailed unit control and operational modes.
HGRH Coil will have a flexible epoxy polymer e-coat uniformly applied to all coil surface areas with no material bridging between fins. The coating process will ensure complete coil encapsulation and a uniform dry film thickness from 0.6 – 1.2 mills on all surface areas including fin edges and meet 5b rating cross hatched adhesion per ASTM B3359- 93.Corrosion durability will be confirmed through testing with no less than 5,000 hours salt spray resistance per ASTM B117-90 using scribed aluminum test coupons. The coil coating will meet the following test standards:
a.MIL-C-46168 Chemical Agent Resistance – DS2, HCL Gas
b.CIDA-A-52474-A (GSA)
c.MIL-STD810F, Method 509.4 (Sand and Dust)
d.MIL-P-53084 (ME)-TACOM Approval
e.MIL-DTL-12468 Decontamination Agent (STB)
f.DPG (Dugway Proving Grounds) Soil & Water Exposure Tests
g.GM9540P-97 Accelerated Corrosion Test (120 cycles)
h.ASTMB117-G85 Modified Salt Spray (Fog) Testing-2,000 hours (tested by ARL for Lockheed Martin)

Compressor: Digital Scroll-1st Circuit Only

All units shall have direct-drive, hermetic, digital scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors. Crankcase heaters shall be included. Compressor shall be able to fully modulate from 20%-100%.

Outdoor Coil Type: Air Cooled Fin & Tube

(Fin and Tube Coil) - Internally finned, copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Coils shall be leak tested at the factory to ensure the pressure integrity. The condenser coil shall be leak tested to 500 psig and pressure tested to 500 psig. The condenser coil shall have a fin design with slight gaps for ease of cleaning.
Outdoor Fans: Shall be direct drive vertical discharge design with low-noise corrosion resistant glass reinforced

polypropylene props, powder coated wire discharge guards and electro-plated motor mounting brackets. Fans shall be statically and dynamically balanced.

Heat Type - Primary: Electric - SCR Modulating

Primary heat is supplied using Electric Resistance heaters. Heaters shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment. Heating elements shall be open coil, 80% nickel, 20% chromium, Type A resistance wire, Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1" into the air stream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into supporting brackets. Brackets are not to be spaced more than 4-1/2" apart. Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover. Open coil heaters shall be furnished with an airflow switch, disconnecting contactors, fuses (if over 48 amps), control circuit transformer (with primary fusing on Class I circuits as required), built-in, snap acting, door interlock disconnect switch, and a disk type, automatic reset thermal cutout for primary overtemperature protection. Heaters shall also be furnished with disk type, load-carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible overtemperature devices are not acceptable. For modulating heaters, control will be SCR type. For staged heaters, 5kW capacity will be 2 stage and all heaters above 5kW will be 4 stage. Unit shall be suitable for use with Electric Resistance Heat.

Heat Capacity - Primary: 20 kW

Primary heat is supplied using Electric Resistance heaters. Heaters shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment. Heating elements shall be open coil, 80% nickel, 20% chromium, Grade A resistance wire. Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1 inch into the air stream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into supporting brackets. Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover. Heaters shall be furnished with a disc type, automatic reset thermal cutout for primary over temperature protection. All heaters shall also be furnished with disc type, load-carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible over temperature devices are not acceptable. Unit shall be suitable for use with Electric Resistance Heat.

Supply Fan Motor Type: Direct Drive w/VFD

Supply Fan motor shall be direct drive type with factory installed Variable Frequency Drive (unless no controls option is selected, VFD can be provided by others). All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT). All Fans shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

Exhaust Fan Motor Type: Direct Drive w/VFD

Exhaust Fan motor shall be direct drive type with factory installed Variable Frequency Drive (unless no controls option is selected, VFD can be provided by others). All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 2005 (EPACT). All Fans shall be mounted on rubber vibration isolators, to reduce the transmission of noise.

Fan Piezo Rings: Supply Fan Piezo Ring/Tap

Air flow measurement will be accomplished through the use of Piezo Ring/Tap technology installed in the supply fan wheel area.

Unit Controls: Discharge Air Control - UC600

Unit is completely factory wired with necessary controls and contactor pressure lugs for power wiring. Units will provide an external location for mounting fused disconnect device. PLC controls are provided for all 24 volt control functions. The resident control algorithms will make all heating, cooling and/or ventilating decisions in response to electronic signals from sensors measuring outdoor temperature and humidity. The control algorithm maintains accurate temperature control, minimizes drift from set point and provides better building comfort. A centralized PLC (UC600) will provide anti-short cycle timing for a higher level of machine protection. Terminals are provided for a field installed dry contact or switch closure to put the unit in the Occupied or Unoccupied modes.

Filter Options: MERV-13, 80%

Aluminum Mesh Filters (D, K and N Cabinets) and Galvanized Mesh Bird Screen (B and G Cabinets) shall be installed on the intake of the unit. In addition, one row of 2 inch MERV-13 rated filters (80 percent) shall be installed prior to the evaporator coil. Unit shall be equipped with a 6" filter rack upstream of the evaporator. Frame shall be field-adjustable to match any filter combination specified in the attached selection.

Energy Recovery: ERV-Composite Construction with Frost Protection w/ VFD

Energy recovery wheel performance shall be AHRI 1060 certified and bear the AHRI certified label. The rotating wheel heat exchanger is composed of a rotating cylinder in an insulated cassette frame complete with removable energy transfer media, seals, drive motor and drive belt. Energy transfer media shall be constructed of a durable synthetic lightweight polymer. The total energy recovery wheel is coated with a desiccant tat shall be either Type-A silica gel or 3A molecular sieve and permanently bonded to the energy transfer media without the use of binders or adhesives. The lightweight polymer substrate will not degrade nor require additional coatings for application in marine or coastal environments. Coated segments are cleanable outside of the cabinet with detergent or alkaline coil cleaner and water. Desiccant will not dissolve nor deliquesce in the presence of water or high humidity.

ERV Rotation sensor: Rotation sensor

Inductive Proximity Sensors detect metal objects without contact and are characterized by a long service life and extreme ruggedness. With the latest ASIC technology, the manufacture's sensors offer the ultimate in precision and reliability. Their sensors are the intelligent, reliable route to implementing wheel rotation.

Electrical Options: Non-Fused Disconnect

A 3-pole, molded case, HACR circuit breaker with provisions for through the base electrical connections shall be factory installed. Wiring will be provided from the circuit breaker to the unit high voltage terminal block. The switch will be UL/CSA agency recognized. The circuit breaker will be sized per NEC and UL guidelines.

Factory wired Voltage/Phase monitor shall be included as standard. In the event of any of the following, the units will be shut down and upon correction of the fault condition the unit will reset and restart automatically.

1. Phase Unbalance Protection: Factory set 2%
2. Over/Under/Brown Out Voltage Protection: +/-10% of nameplate voltage
3. Phase Loss/Reversal

Corrosive Environment Package: Eco Coated Coils - DX/ASHP

Evaporator, Hot Gas Reheat (Optional) and Condenser Coil will have a flexible epoxy polymer e-coat uniformly applied to all coil surface areas with no material bridging between fins. The coating process will ensure complete coil encapsulation and a uniform dry film thickness from 0.6 – 1.2 mills on all surface areas including fin edges and meet 5b rating cross hatched adhesion per ASTM B3359- 93.Corrosion durability will be confirmed through testing with no less than 5,000 hours salt spray resistance per ASTM B117-90 using scribed aluminum test coupons. The coil coating will meet the following test standards:

a.MIL-C-46168 Chemical Agent Resistance – DS2, HCL Gas
b.CIDA-A-52474-A (GSA)
c.MIL-STD810F, Method 509.4 (Sand and Dust)
d.MIL-P-53084 (ME)-TACOM Approval
e.MIL-DTL-12468 Decontamination Agent (STB)
f.DPG (Dugway Proving Grounds) Soil & Water Exposure Tests
g.GM9540P-97 Accelerated Corrosion Test (120 cycles)
h.ASTMB117-G85 Modified Salt Spray (Fog) Testing-2,000 hours (tested by ARL for Lockheed Martin)

Hailguards: Hailguards

Hail guards shall be installed on the outside of the condenser coil. The guards shall consist of perforated metal, of the same gauge and color as the unit itself. Airflow through the hail guards shall not be restricted due to location or size of the perforations. Guards shall be removable to accommodate coil cleaning.

TPLA0A0361EA70A & TRUZA0361KA70(N/B)A
36,000 BTU/H 3' X 3' CEILING CASSETTE
36,000 BTU/H HEAT PUMP UNIVERSAL OUTDOOR

Job Name:

System Reference: Date:

Indoor Unit TPLA0A0361EA70A

Outdoor Unit
- ☐ Standard Model TRUZA0361KA70NA
- ☐ Seacoast Model TRUZA0361KA70BA

INDOOR UNIT FEATURES
- Space-efficient ductless installation
- Equipped with 3D i-see Sensor® for enhanced comfort and energy efficiency
- Airflow settings for high and low ceiling applications
- Individual vane settings for direct/indirect airflow control or variable airflow patterns
- Knockouts for outside-air intake and branch-duct run
- Filter indicator signal
- Easy-to-clean, washable filter (optional high-efficiency filter available - requires multi-function casement)
- Built-in condensate lift mechanism
- Ideal for retail shops, classrooms, office spaces, conference centers, building lobbies, and more
- Multiple control options available:
  - kumo cloud® smart device app for remote access
  - Third-party interface options
  - Wired or wireless controllers

OUTDOOR UNIT FEATURES
- Variable speed INVERTER-driven compressor
- Power receiver pre-charged with refrigerant volume for piping length up to 100 ft
- Low ambient cooling down to 0°F providing 100% capacity
- 24-hour continuous operation (cooling mode)
- High pressure protection
- Fast restart
- Superior energy and operational efficiency

SPECIFICATIONS: TPLA0A0361EA70A & TRUZA0361KA70(N/B)A

Cooling at 95°F[1]	Maximum Capacity	BTU/H	36,000
	Rated Capacity	BTU/H	36,000
	Minimum Capacity	BTU/H	16,000
	Maximum Power Input	W	2,780
	Rated Power Input	W	2,780
	Moisture Removal	Pints/h	4.5
	Sensible Heat Factor		0.86
	Power Factor	%	93.7/93.7
Heating at 47°F[2]	Maximum Capacity	BTU/H	42,000
	Rated Capacity	BTU/H	38,000
	Minimum Capacity	BTU/H	18,000
	Maximum Power Input	W	3,020
	Rated Power Input	W	2,540
	Power Factor	%	93.6/93.6
Heating at 17°F[3]	Maximum Capacity	BTU/H	25,500
	Rated Capacity	BTU/H	22,000
	Maximum Power Input	W	2,550
	Rated Power Input	W	2,490
Heating at 5°F[4]	Maximum Capacity	BTU/H	21,600
	Maximum Power Input	W	2,600
Efficiency	SEER		21.8
	EER[1]		12.9
	HSPF [IV]		10.4
	COP at 47°F[2]		4.38
	COP at 17°F at Maximum Capacity[3]		2.94
	COP at 5°F at Maximum Capacity[4]		2.43
	ENERGY STAR® Certified		Yes
Electrical	Voltage, Phase, Frequency		208/230, 1, 60
	Guaranteed Voltage Range	V AC	198 - 253
	Voltage: Indoor - Outdoor, S1-S2	V AC	208/230
	Voltage: Indoor - Outdoor, S2-S3	V DC	24
	Short-circuit Current Rating [SCCR]	kA	5
	Recommended Fuse/Breaker Size (Oudoor)	A	30
	Recommended Wire Size [Indoor - Outdoor]	AWG	14
	Power Supply		Indoor unit is powered by the outdoor unit
Indoor Unit	MCA	A	2.0
	Fan Motor Full Load Amperage	A	0.95
	Fan Motor Output	W	120
	Fan Motor Type		DC Motor
	Airflow Rate at Cooling, Dry	CFM	670–850–1020–1200
	Airflow Rate at Cooling, Wet	CFM	630–810–980–1160
	Airflow Rate at Heating, Dry	CFM	670–850–1020–1200
	Sound Pressure Level [Cooling]	dB[A]	32–37–41–44
	Sound Pressure Level [Heating]	dB[A]	32–37–41–44
	Drain Pipe Size	In. [mm]	1-1/4 [32]
	Condensate Lift Mechanism, Maximum Distance	In. [mm]	33-7/16 [849]
	Coating on Heat Exchanger		—
	External Finish Color		White Munsell 6.4Y 8.9/0.4
	Unit Dimensions	W x D x H: In. [mm]	33-1/16 // 37-13/32 x 33-1/16 // 37-13/32 x 11-3/4 // 1-9/16 [840 // 950 x 840 // 950 x 298 // 40]
	Package Dimensions	W x D x H: In. [mm]	35-9/16 // 39-6/16 x 34-5/16 // 38-3/16 x 16-9/16 // 4-12/16 [903 // 1000 x 871 // 970 x 421 // 121]
	Unit Weight	Lbs. [kg]	56 // 11 [25 // 5]
	Package Weight	Lbs. [kg]	77 [35]
Indoor Unit Operating Temperature Range	Cooling Intake Air Temp [Maximum / Minimum]*	°F	90 DB, 72 WB / 66 DB, 61 WB
	Heating Intake Air Temp [Maximum / Minimum]	°F	77 DB / 59 DB

NOTES:

AHRI Rated Conditions
(Rated data is determined at a fixed compressor speed)

[1]Cooling (Indoor // Outdoor) °F 80 DB, 67 WB // 95 DB, 75 WB
[2]Heating at 47°F (Indoor // Outdoor) °F 70 DB, 60 WB // 47 DB, 43 WB
[3]Heating at 17°F (Indoor // Outdoor) °F 70 DB, 60 WB // 17 DB, 15 WB

Conditions

[4]Heating at 5°F (Indoor // Outdoor) °F 70 DB, 60 WB // 5 DB, 4 WB
[5]Heating at -4°F (Indoor // Outdoor) °F 70 DB, 60 WB // -4 DB, -5 WB
[6]Heating at -5°F (Indoor // Outdoor) °F 70 DB, 60 WB // -5 DB, -6 WB
[7]Heating at -13°F (Indoor // Outdoor) °F 70 DB, 60 WB // -13 DB, -14 WB

*Outdoor Unit Operating Temperature Range (Cooling Air Temp (Maximum / Minimum)):
- Wind baffles required to operate below 23°F DB in cooling mode.
- Heat pump system with wind baffle: 0°F - 115°F.
- Refer to wind baffle documentation for further information.

**Outdoor Unit Operating Temperature Range (Cooling Thermal Lock-out / Re-start Temperatures; Heating Thermal Lock-out / Re-start Temperatures):
- System cuts out in heating mode to avoid thermistor error and automatically restarts at these temperatures.

SEACOAST PROTECTION (TRU*A0*******BA MODELS)
- External Outer Panel: Phosphate coating + Acrylic-Enamel coating
- Fan Motor Support: Epoxy resin coating (at edge face)
- Separator Assembly Valve Bed: Epoxy resin coating (at edge face)
- Blue Fin treatment is an anti-corrosion treatment that is applied to the condenser coil to protect it against airborne contaminants.

SPECIFICATIONS: TPLA0A0361EA70A & TRUZA0361KA70(N/B)A

Outdoor Unit	MCA	A	25.0
	MOCP	A	31
	Fan Motor Full Load Amperage	A	0.5 + 0.5
	Fan Motor Output	W	74
	Airflow Rate	CFM	3880/3880
	Refrigerant Control		LEV
	Defrost Method		Reverse Cycle
	Coating on Heat Exchanger		Blue Fin Coating (BS Model only)
	Sound Pressure Level, Cooling[1]	dB(A)	52
	Sound Pressure Level, Heating[2]	dB(A)	53
	Compressor Type		INVERTER-driven twin rotary
	Compressor Model		MNB33FBRMC-L
	Compressor Rated Load Amps	A	8
	Compressor Locked Rotor Amps	A	13.0
	Compressor Oil Type // Charge	oz.	FV50S // 45
	External Finish Color		Ivory Munsell 3Y 7.8/1.1
	Base Pan Heater		N/A
	Unit Dimensions	W x D x H: In. [mm]	41-5/16 x 13 (+1-3/16) x 52-11/16 [1050 x 330 (+30) x 1338]
	Package Dimensions	W x D x H: In. [mm]	42-15/16 x 17-11/16 x 56-4/16 [1091 x 450 x 1429]
	Unit Weight	Lbs. [kg]	214 [97]
	Package Weight	Lbs. [kg]	245 [111]
Outdoor Unit Operating Temperature Range	Cooling Air Temp [Maximum / Minimum]*	°F	115 DB / 0 DB
	Heating Air Temp [Maximum / Minimum]	°F	70 DB, 59 WB / -4 DB, -4 WB
	Heating Thermal Lock-out / Re-start Temperatures**	°F	-8 / -4
Refrigerant	Type		R410A
	Charge	Lbs, oz	10, 6.0
	Chargeless Piping Length	Ft. [m]	0.0 [30.0]
	Additional Refrigerant Charge Per Additional Piping Length	oz./Ft. [g/m]	0.7 [50]
Piping	Gas Pipe Size O.D. [Flared]	In.[mm]	5/8 [15.88]
	Liquid Pipe Size O.D. [Flared]	In.[mm]	3/8 [9.52]
	Maximum Piping Length	Ft. [m]	165 [50]
	Maximum Height Difference	Ft. [m]	100 [30]
	Maximum Number of Bends		15

NOTES:

AHRI Rated Conditions (Rated data is determined at a fixed compressor speed)

[1]Cooling (Indoor // Outdoor)	°F	80 DB, 67 WB // 95 DB, 75 WB
[2]Heating at 47°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 47 DB, 43 WB
[3]Heating at 17°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 17 DB, 15 WB

Conditions

[4]Heating at 5°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 5 DB, 4 WB
[5]Heating at -4°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -4 DB, -5 WB
[6]Heating at -5°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -5 DB, -6 WB
[7]Heating at -13°F (Indoor // Outdoor)	°F	70 DB, 60 WB // -13 DB, -14 WB

*Outdoor Unit Operating Temperature Range (Cooling Air Temp (Maximum / Minimum)):
- Wind baffles required to operate below 23°F DB in cooling mode.
- Heat pump system with wind baffle: 0°F - 115°F.
- Refer to wind baffle documentation for further information.

**Outdoor Unit Operating Temperature Range (Cooling Thermal Lock-out / Re-start Temperatures; Heating Thermal Lock-out / Re-start Temperatures):
- System cuts out in heating mode to avoid thermistor error and automatically restarts at these temperatures.

SEACOAST PROTECTION (TRU*A0*******BA MODELS)
- External Outer Panel: Phosphate coating + Acrylic-Enamel coating
- Fan Motor Support: Epoxy resin coating (at edge face)
- Separator Assembly Valve Bed: Epoxy resin coating (at edge face)
- Blue Fin treatment is an anti-corrosion treatment that is applied to the condenser coil to protect it against airborne contaminants.

INDOOR UNIT ACCESSORIES: TPLA0A0361EA70A

Control Interface	3-Pin Connector	☐ PAC-715AD
	BACnet® and Modbus® Interface	☐ PAC-UKPRC001-CN-1
	CN24 Relay Kit	☐ CN24RELAY-KIT-CM3
	IT Extender	☐ PAC-WHS01IE-E
	kumo station® for kumo cloud®	☐ TAC-WHS01HC-E
	Lockdown bracket for remote controller	☐ RCMKP1CB
	Remote Operation Adapter‡	☐ PAC-SF40RM-E
	Thermostat Interface	☐ PAC-US444CN-1
	USNAP Adapter	☐ PAC-WHS01UP-E
	Wireless Interface for kumo cloud®	☐ PAC-USWHS002-WF-2
Remote Sensor	Flush Mount Temperature Sensor	☐ PAC-USSEN001-FM-1
	Remote Temperature Sensor	☐ PAC-SE41TS-E
	Wireless temperature and humitity sensor for kumo cloud®	☐ PAC-USWHS003-TH-1
Wired Remote Controller	Deluxe Wired MA Remote Controller†	☐ TAR-40MAAU
	Simple MA Remote Controller†	☐ TAC-YT53CRAU-J
	Touch MA Controller†	☐ TAR-CT01MAU-SB
Wireless Remote Controller	kumo touch™ RedLINK™ Wireless Controller	☐ MHK2
	Wireless Remote Contoller	☐ PAR-SL100A-E
	Wireless Signal Receiver Panel	☐ PAR-SR4LU-E
Casement	Multi-function Casement	☐ PAC-SJ41TM-E
Condensate	Blue Diamond (Advanced) Mini Condensate Pump w/ Reservoir & Sensor (208/230V) [recommended]	☐ X87-721
	Blue Diamond (MegaBlue Advanced) Condensate Pump w/ Reservoir & Sensor	☐ X87-835
	Blue Diamond Sensor Extension Cable — 15 Ft.	☐ C13-103
Disconnect Switch	(30A/600V/UL) [fits 2” X 4” utility box] - Black	☐ TAZ-MS303
	(30A/600V/UL) [fits 2” X 4” utility box] - White	☐ TAZ-MS303W
Filter	High Efficiency Filter Element	☐ PAC-SH59KF-E
i-see Sensor® Panel	Grille with 3D i-see Sensor® (required)	✔ TLP-41EAEU
Lineset	10’ x 3/8” x 10’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-10
	100’ x 3/8” x 100’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-100
	15’ x 3/8” x 15’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-15
	30’ x 3/8” x 30’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-30
	50’ x 3/8” x 50’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-50
	65’ x 3/8” x 65’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-65
Shutter Plate	Shutter Plate	☐ PAC-SJ37SP-E
Space Panel	Architectural Surround for Ceiling Recessed Units	☐ PLFY-ITP1
	Space Panel	☐ PAC-SJ38AS-E

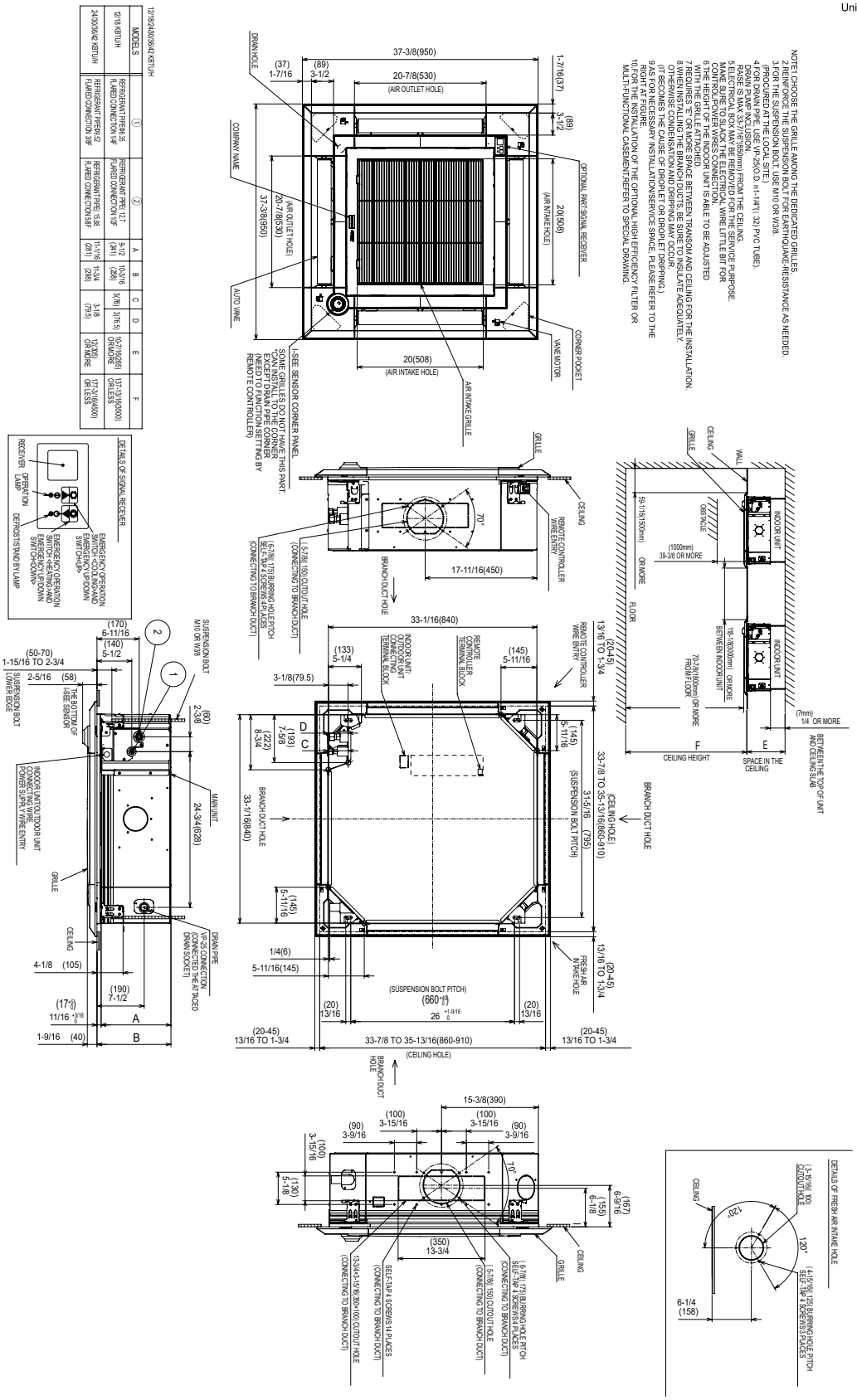
NOTES:
‡PAC-SF40RM-E (Unable to use with wireless remote controller)

OUTDOOR UNIT ACCESSORIES: TRUZA0361KA70(N/B)A

Air Outlet Guide	Air Outlet Guide (1 Piece)	☐ PAC-ADG096AA-E (two pieces are required)
Control/Service Tool	Control/Service Tool	☐ PAC-SK52ST
	M- & P-Series Maintenance Tool Cable Set	☐ M21EC0397
	USB/UART Conversion Cable (Required for all laptop connection)	☐ M21EC1397
Distribution pipe	Twinning Distribution Pipe (50:50)††	☐ MSDD-50TR-E
Drain Socket	Drain Socket	☐ PAC-SG61DS-E
M-NET Converter	M-NET Converter	☐ PAC-SJ85MA-E
	M-NET Converter	☐ PAC-SJ95MA-E
Mini-Split Wire	14 Gauge, 4 wire MiniSplit Cable—250 ft. roll	☐ S144-250
	14 Gauge, 4 wire MiniSplit Cable—50 ft. roll	☐ S144-50
	16 Gauge, 4 wire MiniSplit Cable—250 ft. roll	☐ S164-250
	16 Gauge, 4 wire MiniSplit Cable—50 ft. roll	☐ S164-50
Mounting Pad	Condensing Unit Mounting Pad: 24” x 42” x 3”	☐ ULTRILITE2
Stand	18” Dual Fan Stand	☐ QSMS1802M
	24” Dual Fan Stand	☐ QSMS2402M
	Condenser Wall Bracket	☐ QSWB2000M-1
	Condenser Wall Bracket -Stainless Steel Finish	☐ QSWBSS
	Outdoor Unit Stand — 12” High	☐ QSMS1202M
Wind Baffle	Front Wind Baffle	☐ WB-PA3 (two pieces are required)
	Rear Wind Baffle	☐ WB-RE6
	Side Advanced Wind Baffle	☐ WB-SD6

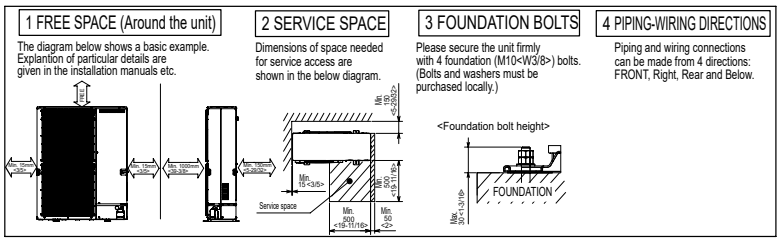
INDOOR UNIT DIMENSIONS: TPLA0A0361EA70A

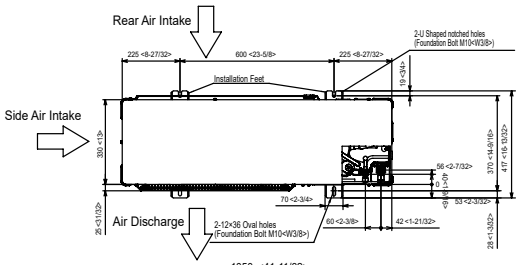
Unit: inch (mm)



OUTDOOR UNIT DIMENSIONS: TRUZA0361KA70(N/B)A

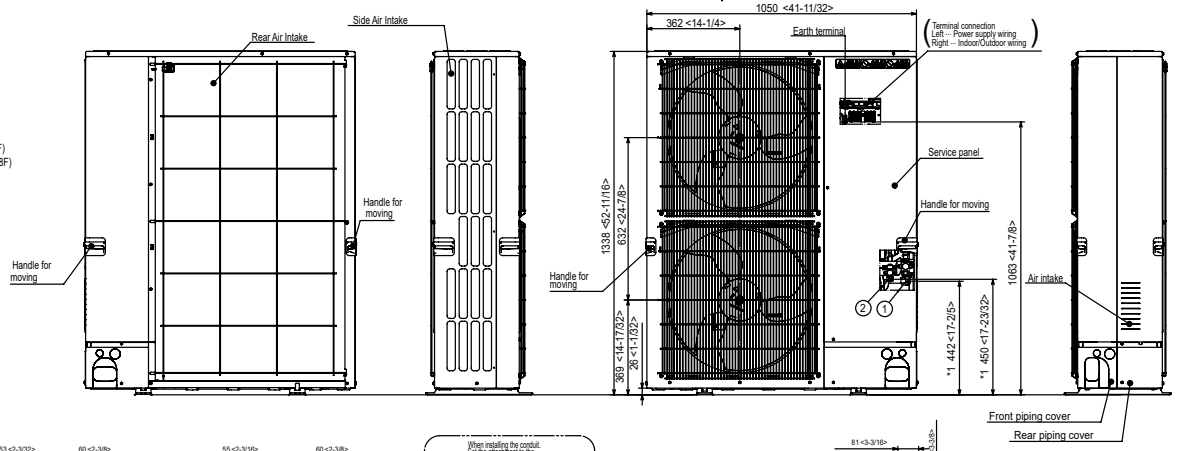
Unit: mm<in>



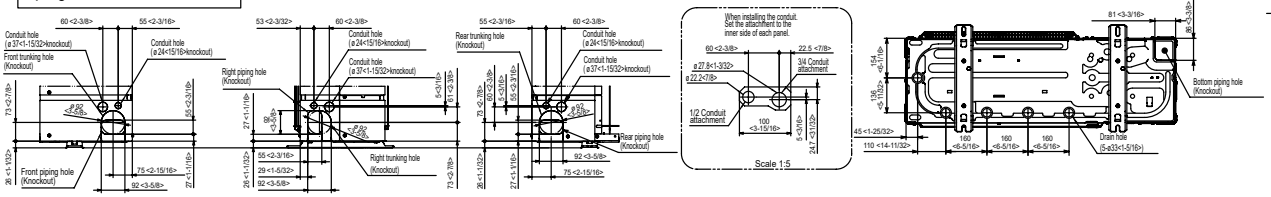


Example of Notes

① ·· Refrigerant GAS pipe connection (FLARE) ø15.88(5/8F)
② ·· Refrigerant LIQUID pipe connection (FLARE) ø9.52(3/8F)
*1 ··· Indication of STOP VALVE connection location.



Piping Knockout Hole Details



FORM# TPLA0A0361EA70A & TRUZA0361KA70(N/B)A - 202108

Submittal

Prepared For:
B&I Contractors

Date: February 14, 2022

Job Name:
Ft Lauderdale Fire Station 54

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
1	3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C)

Andrew Miller
Trane U.S. Inc.
2884 Corporate Way
Miramar, FL 33025
Office Phone: (954) 499-6900

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Please Note:

- Contractor to review submittal for accuracy prior to equipment release.
- New RTU to fit on existing roof curb – contractor to confirm.

Table of Contents

Tag Data - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	RTU-2	1	5 Ton R-410A PKGD Unitary Cooling RTU	THC067E3R0A

Product Data - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop (T4C)

Item: A1 Qty: 1 Tag(s): RTU-2

DX cooling
High efficiency
Convertible configuration
5 Ton 17 SEER
208-230/60/3
Microprocessor controls
Economizer Dry Bulb 0-100% with barometric relief
True VAV w/std motor
Standard panels/Pleated Filters MERV 13
Standard condenser coil with hail guard
Condensate Drain Pan Overflow Switch
Anti-corrosion coating on condenser coil

Product Report - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2

Trane Precedent Cooling Packaged Rooftop

Unit Overview - THC067E3R0A**DED10000000A000000000000000

Application	Unit Size	Supply Fan		External Dimensions (in.)			Operating Weight		EER	IEER/SEER	Elevation
		Airflow	External Static Pressure	Height	Width	Length	Minimum	Maximum			
DX cooling	5 Ton 17 SEER (067)	2000 cfm	1.000 in H2O	3.41 ft	4.44 ft	7.39 ft	676.0 lb	953.0 lb	13.0 EER	17.20	

Unit Features

Fresh Air Selection	Econ-Dry Bulb 0-100% w/ bar ref 3 ph
SupplyFan/Drive/ MotorType	True VAV w/std motor
Panels/Filters	Std panels/2" pltd filters MERV 13-3 ph

Unit Electrical

Voltage/phase/hertz	208-230/60/3
MCA	33.00 A
MOP	45.00 A

Controls

Unit Controls	Microprocessor controls 3ph
System Monitoring Controls 1	Condensate drain pan overflow switch 3ph

Cooling Section

Entering Dry Bulb	68.60 F
Entering Wet Bulb	60.80 F
Ambient Temp	95.00 F
Leaving Coil Dry Bulb	52.21 F
Leaving Coil Wet Bulb	51.26 F
Leaving Unit Dry Bulb	53.88 F
Leaving Unit Wet Bulb	51.98 F
Refrigeration System Options	
Leaving Dew Point	50.52 F

Capacity	
Gross Total	52.45 MBh
Gross Sensible	35.40 MBh
Net Total	49.68 MBh
Net Sensible	32.64 MBh
Fan Motor Heat	2.76 MBh
Refrig Charge-circuit 1	11.8 lb

Fan Section

Indoor Fan Data	
Type	FC Centrifugal
Evap Fan FLA	0.00 A
Indoor Fan Performance	
Airflow	2000 cfm
Design ESP	1.000 in H2O
Component SP	0.220 in H2O
Total SP	1.220 in H2O
Supply Motor Horsepower	1.000 hp
Indoor Motor Operating Power	0.93 bhp
Indoor Motor Power	0.69 kW
Indoor RPM	1118 rpm

Outdoor Fan Data	
Fan Quantity	0
Outdoor Fan Performance	
Outdoor Motor Power	0.37 kW
Condenser Fan FLA	2.50 A

Compressor Section

Power	3.76 kW
Circuit 1 RLA	16.20 A
Circuit 2 RLA	0.00 A

Acoustics

Sound Path	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz

Mechanical Specifications - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2

General (Precedent 17 Plus)
The units shall be convertible airflow. The operating range shall be between 125°F and 0°F in cooling as standard from the factory for units with microprocessor controls. . Cooling performance shall be rated in accordance with AHRI testing procedures. All units shall be factory assembled, internally wired, fully charged with *R-410A*, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory. Wiring internal to the unit shall be colored and numbered for simplified identification. Units shall be UL listed and labeled, classified in accordance to UL 1995/CAN/CSA No. 236-M90 for Central Cooling Air Conditioners. Canadian units shall be CSA Certified.

Casing
Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel. Exterior surfaces shall be cleaned, phosphatized, and finished with a weather-resistant baked enamel finish. Units surface shall be tested 672 hours in a salt spray test in compliance with ASTM B117. Cabinet construction shall allow for all maintenance on one side of the unit. Service panels shall have lifting handles and be removed and reinstalled by removing two fasteners while providing a water and air tight seal. All exposed vertical panels and top covers in the indoor air section shall be insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material. The base of the unit shall be insulated with 1/8", foil-faced, closed-cell insulation. All insulation edges shall be either captured or sealed. The units base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8" inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up. The base of the unit shall have provisions for forklift and crane lifting, with forklift capabilities on three sides of the unit.

Unit Top
The top cover shall be one piece construction or, where seams exist, it shall be double-hemmed and gasket-sealed. The ribbed top adds extra strength and enhances water removal from unit top.

Compressors (Precedent 17 Plus)
All units shall have direct-drive and hermetic type compressors with centrifugal type oil pumps. Motor shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Internal overloads shall be provided with the scroll compressors.

Crankcase heaters shall be included.

Two-stage compressors are outstanding for humidity control and light load cooling conditions.

Evaporator and Condenser Coils
Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin shall be standard. Evaporator coils are standard for all 3 to 10 ton standard efficiency models. Microchannel condenser coils are standard for all 3 to 10 ton standard efficiency models and 4, 5, 6, 7.5, 8.5 ton high efficiency models. The microchannel type condenser coil is not offered on the 4 and 5 ton dehumidification model. Due to flat streamlined tubes with small ports, and metallurgical tube-to-fin bond, microchannel coil has better heat transfer performance. Microchannel condenser coil can reduce system refrigerant charge by up to 50% because of smaller internal volume, which leads to better compressor reliability. Compact all-aluminum microchannel coils also help to reduce the unit weight. These all aluminum coils are recyclable. Galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection. In addition, flat streamlined tubes also make microchannel coils more dust resistant and easier to clean. Coils shall be leak tested at the factory to ensure the pressure integrity. The evaporator coil and condenser coil shall be leak tested to 600 psig. The assembled unit shall be leak tested to 465 psig. The condenser coil shall have a patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning. A plastic, dual-sloped, removable and reversible condensate drain pan with through-the-base condensate drain is standard.

Condensate Overflow Switch
This option shall shut the unit down in the event that a clogged condensate drain line prevents proper condensate removal from the unit.

Tool-less Hail Guards
Tool-less, hail protection quality coil guards are available for condenser coil protection.

Outdoor Fans
The outdoor fan shall be direct-drive, statically and dynamically balanced, draw-through in the vertical discharge position. The fan motor shall be permanently lubricated and shall have built-in thermal overload protection.

Indoor Fan
The following units shall be equipped with a direct drive plenum fan design (T/YSC120F,T/YHC074F, T/YHC092F,T/YHC102F, 120F). Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor. All plenum fan designs will have a variable speed adjustment potentiometer located in the control box.

3 to 5 ton units (high efficiency 3-phase with optional motor) are belt driven, FC centrifugal fans with adjustable motor sheaves. 3 to 5 ton units have multispeed, direct drive motors. All 6 to 8½ ton units (standard efficiency) shall have belt drive motors with an adjustable idler-arm assembly for quick-adjustment to fan belts and motor sheaves. All motors shall be thermally protected. All 10 tons, 6 ton (074), 7½ to 8½ (high efficiency) units have variable speed direct drive motors. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Indoor Fan (Precedent 17 Plus)
All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

Controls
Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. A choice of microprocessor or electromechanical controls shall be available. Microprocessor controls provide for volt control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort. A centralized Microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

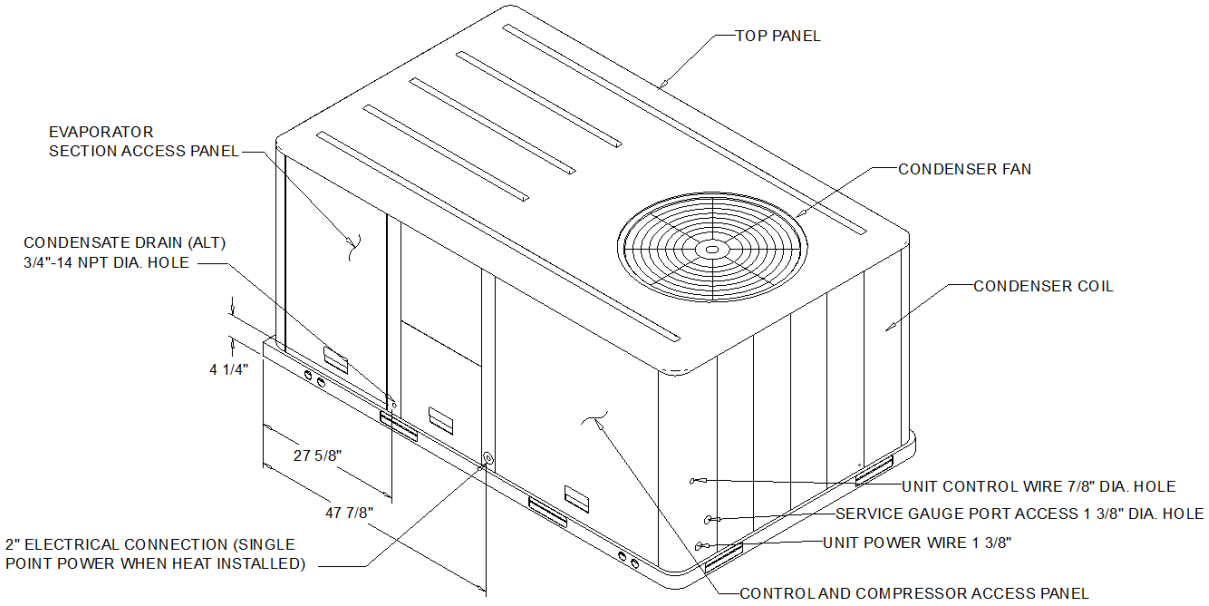
Controls (Precedent 17 Plus)
Unit shall be completely factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Unit shall provide an external location for mounting a fused disconnect device. Microprocessor controls provide for volt control functions. The resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures. The control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort. A centralized Microprocessor shall provide anti-short cycle timing and time delay between compressors to provide a higher level of machine protection.

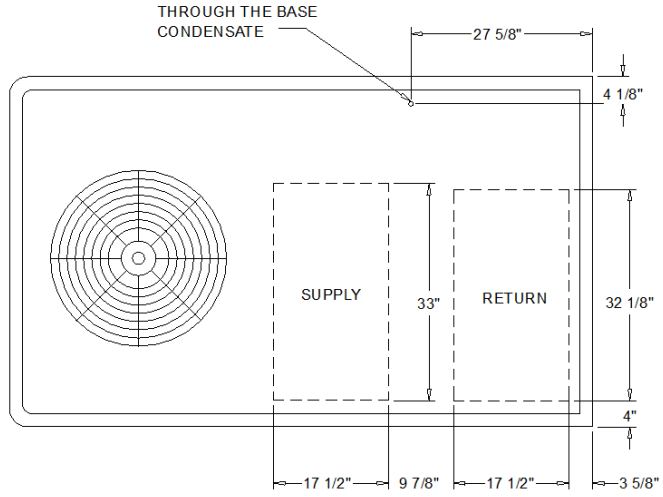
Refrigerant Circuits
Each refrigerant circuit offer thermal expansion valve as standard. Service pressure ports, and refrigerant line filter driers are factory-installed as standard. An area shall be provided for replacement suction line driers.

Phase monitor
Phase monitor shall provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator. There are no field adjustments. The module will automatically reset from a fault condition.

Economizer
This accessory shall be available with or without barometric relief. The assembly includes fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control. The barometric relief shall provide a pressure operated damper that shall be gravity closing and shall prohibit entrance of outside air during the equipment off cycle. Optional solid state or differential enthalpy control shall be available for either factory or field installation. The economizer arrives in the shipping position and shall be moved to the operating position by the installing contractor.

Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2

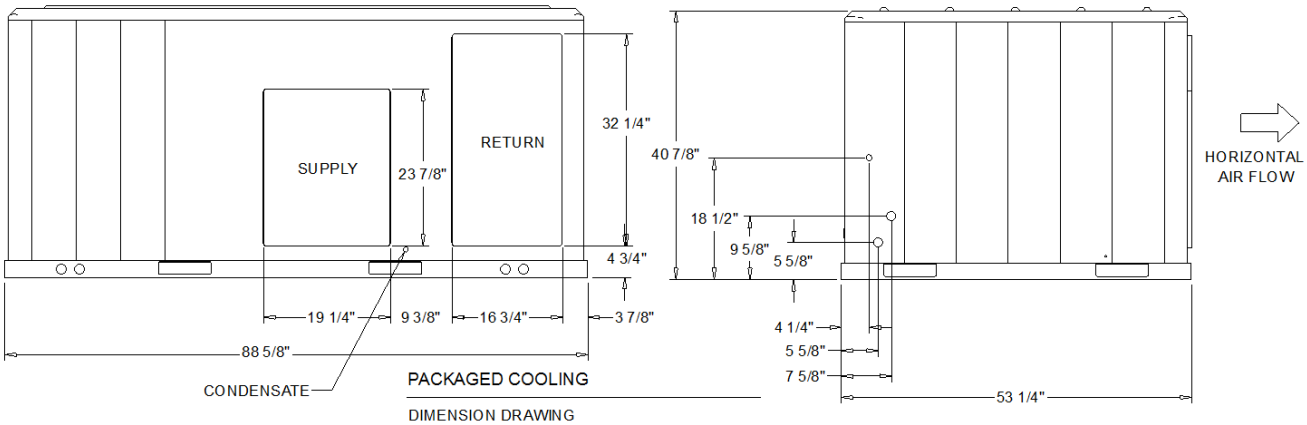




NOTES:
1. THRU -THE -BASE ELECTRICAL IS NOT STANDARD ON ALL UNITS.
2. VERIFY ALL DIMENSIONS WITH INSTALLER DOCUMENTS BEFORE INSTALLATION.

PLAN VIEW UNIT

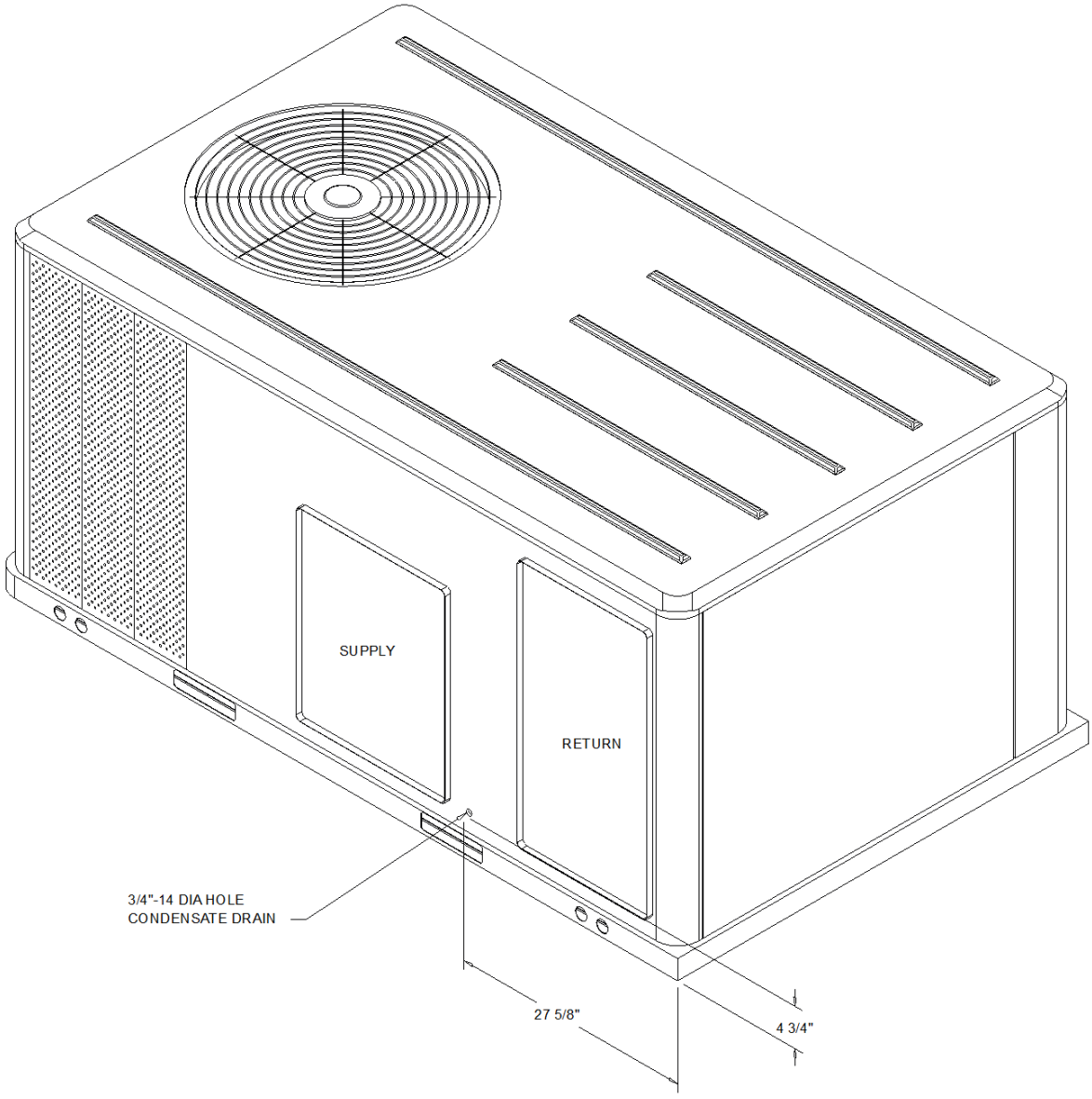
DIMENSION DRAWING



PACKAGED COOLING

DIMENSION DRAWING

Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2



ISOMETRIC-PACKAGED COOLING

Dimensional Drawings - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2

ELECTRICAL / GENERAL DATA

GENERAL (2)(4)(6)

Model:	THC067E
Unit Operating Voltage:	187-253
Unit Primary Voltage:	208
Unit Secondary Voltage	230
Unit Hertz:	60
Unit Phase:	3
SEER	17.2

Standard Motor		Oversized Motor	Field Installed Oversized Motor
Minimum Circuit Ampacity:	33.0	Minimum Circuit Ampacity:	Minimum Circuit Ampacity:
Maximum Fuse Size:	45.0	Maximum Fuse Size:	Maximum Fuse Size:
Maximum (HACR) Circuit Breaker:	45.0	Maximum (HACR) Circuit Breaker:	Maximum (HACR) Circuit Breaker:

INDOOR MOTOR

Standard Motor		Outsized Motor	Field Installed Oversized Motor
Number:	1	Number:	Number:
Horsepower:	1.0	Horsepower:	Horsepower:
Motor Speed (RPM):	--	Motor Speed (RPM):	Motor Speed (RPM):
Phase:	1	Phase:	Phase:
Full Load Amps:	9.4	Full Load Amps:	Full Load Amps:
Locked Rotor Amps:	--	Locked Rotor Amps:	Locked Rotor Amps:

COMPRESSOR Circuit 1/2

Number:	1
Horsepower:	4.3
Phase:	3
Rated Load Amps:	16.2
Locked Rotor Amps:	--

OUTDOOR MOTOR

Number:	1
Horsepower:	0.40
Motor Speed (RPM):	1075
Phase:	1
Full Load Amps:	2.5
Locked Rotor Amps:	--

POWER EXHAUST ACCESSORY (3,7)

(Field Installed Power Exhaust)

Phase:	N/A
Horsepower:	N/A
Motor Speed (RPM):	N/A
Full Load Amps:	N/A
Locked Rotor Amps:	N/A

FILTERS

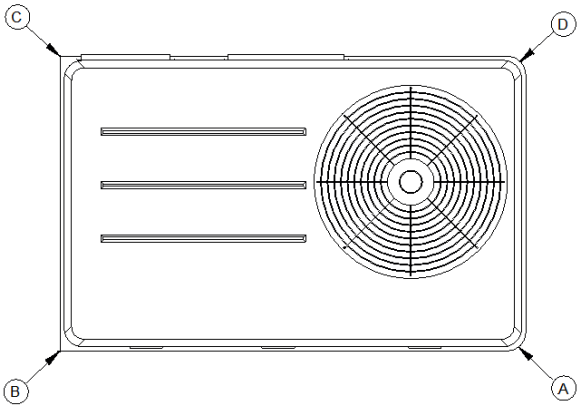
Type:	Throwaway
Furnished:	Yes
Number	4
Recommended	16"x25"x2"

REFRIGERANT (2)

Type	R-410
Factory Charge	
Circuit #1	12.5 lb
Circuit #2	N/A

NOTES:
1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only.
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory.
4. Value includes oversized motor.
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.
7. Installation of this power exhaust kit will affect unit level MCA and could affect MOP sizing having a direct impact on existing field wiring and unit protection devices. The change in MCA/MOP is the sole responsibility of the field installing party. Trane will not issue new nameplates as a result of this power exhaust accessory installation. FLA of the power exhaust kit option must be added to the MCA of the unit for building supply conductor sizing determination.

Weight, Clearance & Rigging - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2



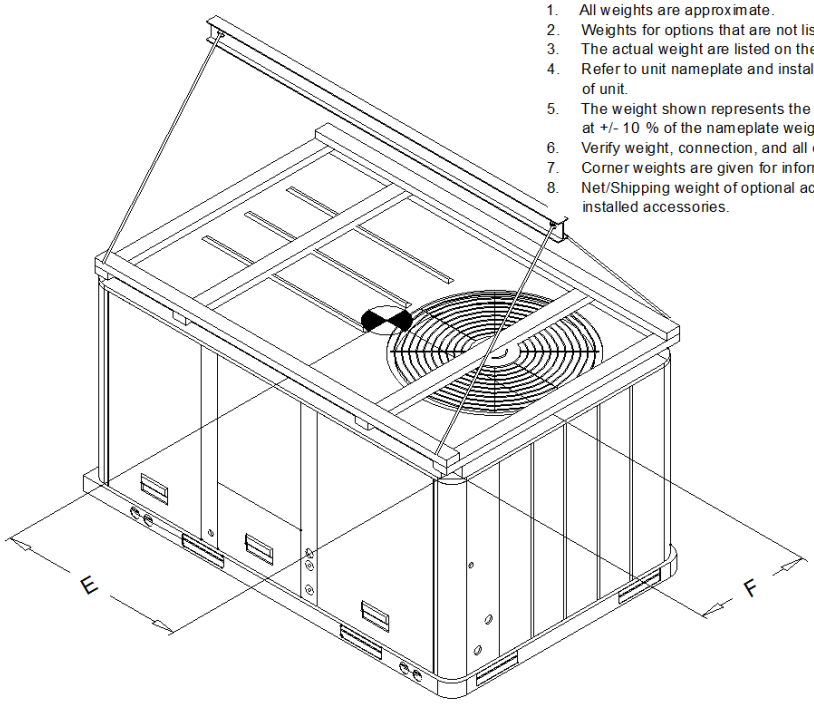
CORNER WEIGHT

INSTALLED ACCESSORIES NET WEIGHT DATA

ACCESSORY	WEIGHTS
ECONOMIZER	36.0 lb
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	
POWER EXHAUST	
HEATER	
REHEAT	
THROUGHT THE BASE ELECTRICAL (FIOPS)	
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	
UNIT MOUNTED DISCONNECT (FIOPS)	
POWERED CONVENIENCE OUTLET (FIOPS)	
HINGED DOORS (FIOPS)	
HAIL GUARD	20.0 lb
SMOKE DETECTOR, SUPPLY / RETURN	
NOVAR CONTROL	
ROOF CURB	

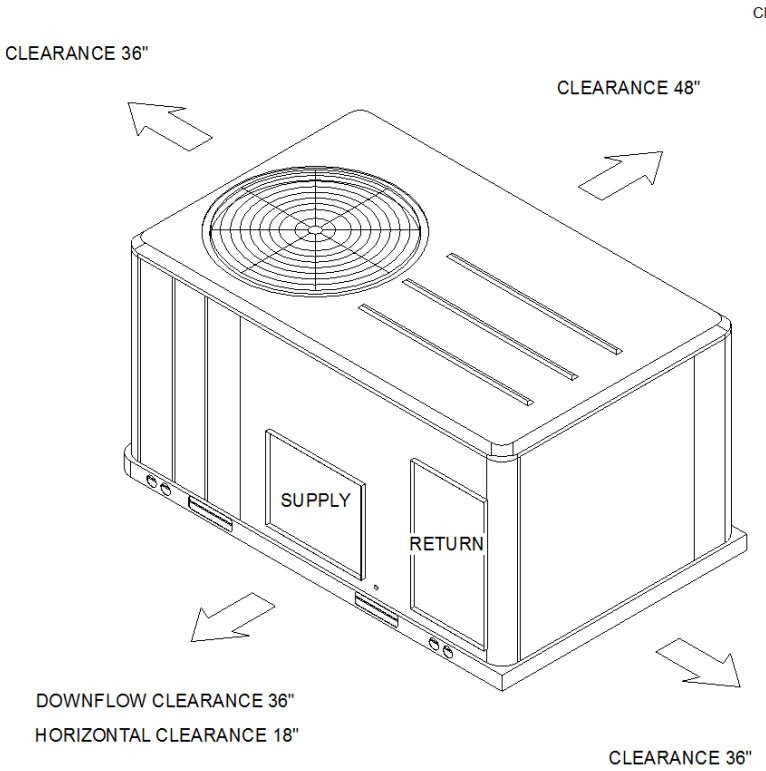
BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITIY	
SHIPPING	NET	A	241.0 lb	C	139.0 lb	(E) LENGHT	(F) WIDTH
841.0 lb	746.0 lb	B	193.0 lb	D	173.0 lb	39"	22"

NOTE:
1. All weights are approximate.
2. Weights for options that are not list refer to Installation guide.
3. The actual weight are listed on the unit nameplate.
4. Refer to unit nameplate and installation guide for weights before scheduling transportation and installation of unit.
5. The weight shown represents the typical unit operating weight for the configuration selected. Estimated at +/- 10 % of the nameplate weight. .
6. Verify weight, connection, and all dimension with installer documents before installation.
7. Corner weights are given for information only.
8. Net/Shipping weight of optional accessories should be added to unit weight when ordering factory or field installed accessories.

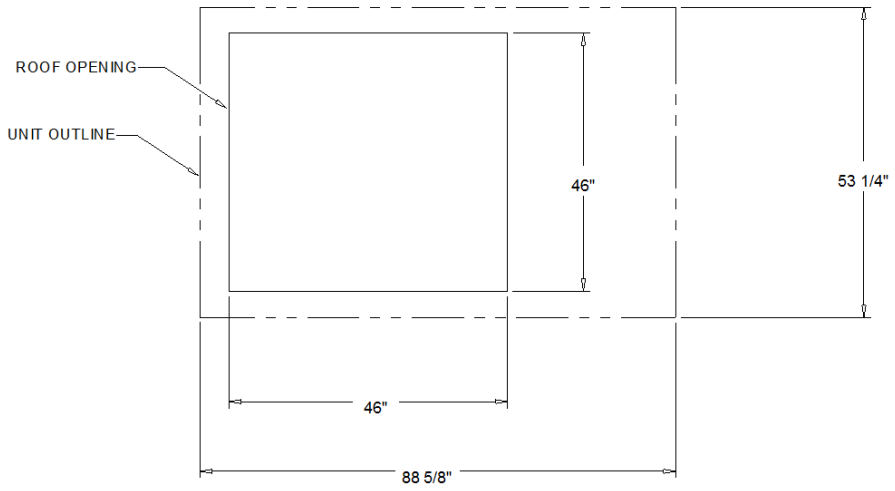


RIGGING AND CENTER OF GRAVITY

Weight, Clearance & Rigging - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2

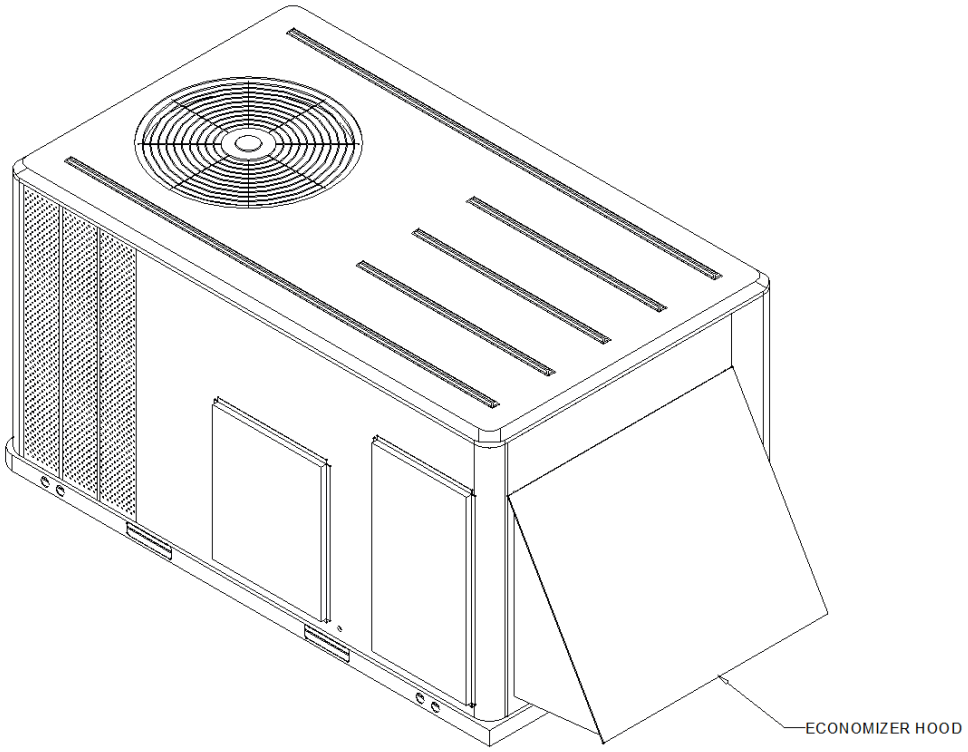


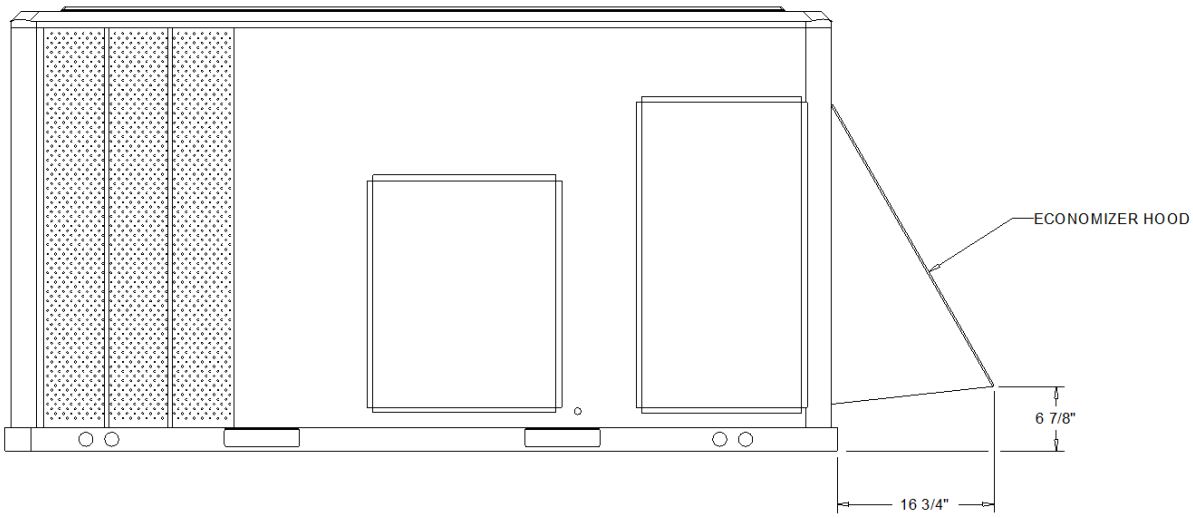
PACKAGED COOLING
CLEARANCE



PACKAGED COOLING
DOWNFLOW TYPICAL ROOF OPENING

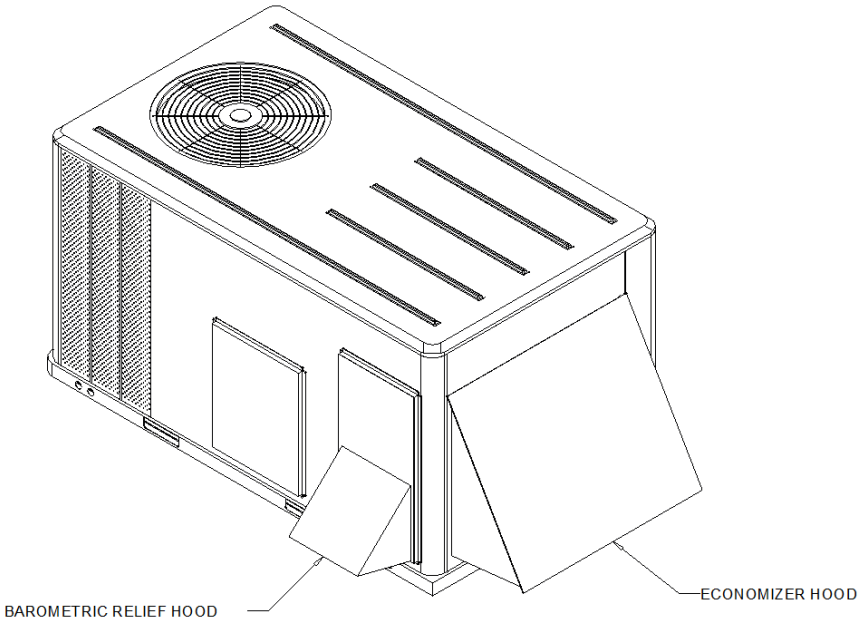
Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2

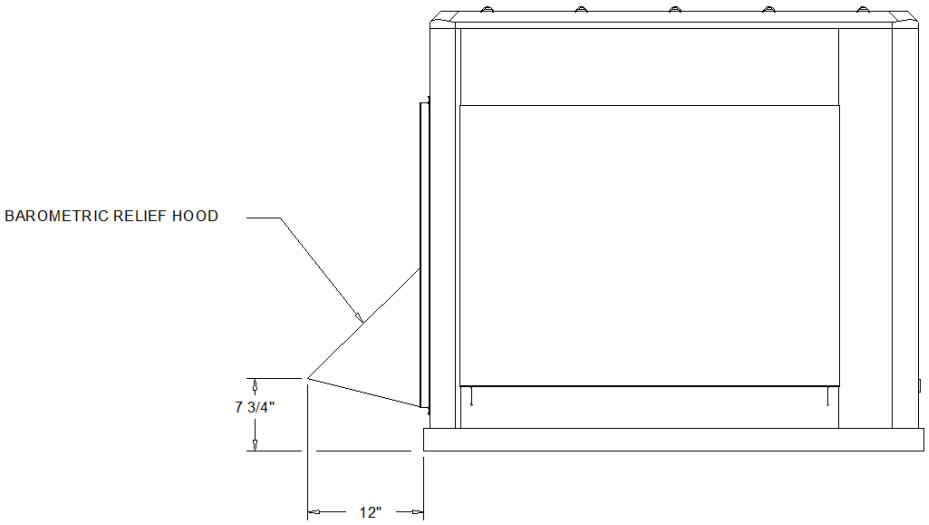




ECONOMIZER HOOD
ACCESSORY

Accessory - 3-10 Ton R-410A PKGD Unitary Cooling Rooftop
Item: A1 Qty: 1 Tag(s): RTU-2





BAROMETRIC RELIEF DAMPER HOOD
ACCESSORY

Submittal

Prepared For:
City of Fort Lauderdale

Date: March 16, 2022

Job Name:
Ft Lauderdale Fire Station 54

Trane U.S. Inc. is pleased to provide the following submittal for your review and approval.

Product Summary

Qty	Product
9	Variable Air Volume Single Duct Terminal Units

Andrew Miller
Trane U.S. Inc.
2884 Corporate Way
Miramar, FL 33025
Office Phone: (954) 499-6900

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Product performance and submittal data is valid for a period of 6 months from the date of submittal generation. If six months or more has elapsed between submittal generation and equipment release, the product performance and submittal data will need to be verified. It is the customer's responsibility to obtain such verification.

Please Note:

- Contractor to review submittal for accuracy prior to equipment release.
- Valve heating airflows are submitted at the minimum allowable CFM based on VAV inlet size and heater KW. See product report below for more information.

Table of Contents

Tag Data - Variable Air Volume Single Duct Terminal Units (Qty: 9)

Item	Tag(s)	Qty	Description	Model Number
A1	VAV-1-3, VAV-2-10	2	Variable Air Volume Single Duct Terminal	VCEF06
A2	VAV-1-4, VAV-2-8	2	Variable Air Volume Single Duct Terminal	VCEF08
A3	VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7	4	Variable Air Volume Single Duct Terminal	VCEF04
A4	VAV-2-9	1	Variable Air Volume Single Duct Terminal	VCEF05

Product Report - Variable Air Volume Single Duct Terminal Units
Item: A1 Qty: 2 Tag(s): VAV-1-3, VAV-2-10

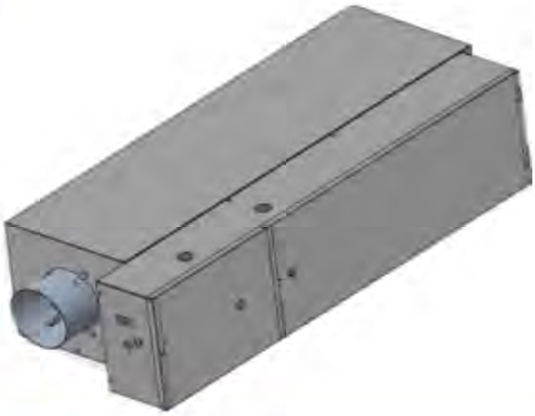
Variable Air Volume Single Duct

Unit Overview - VAV-1-3, VAV-2-10

Unit model	Primary inlet	Design cooling airflow	Min cooling airflow	Trane Supplied Controls
VCEF (Electric Heating)	6" (152mm)	500 cfm	180 cfm	SY210 DDC-Basic (Electric heat- staged)

Construction and Airflow

APD @ cooling airflow	0.220 in H2O
Cooling inlet velocity	2546 ft/min
Valve heating airflow	180 cfm
Unit Insulation	Dual wall with 1" insulation
Elevation	0.00 ft
Operating weight	48.0 lb
Air Leakage Class	Standard Air Leakage



Electrical

Full load amps	9.62 A
Max fuse size	15.00 A
Min circuit ampacity	12.02 A

Controls and Sensors

Actuator	Standard actuator
DTS & HW Valve Harness	Duct temperature sensor -factory mounted
Wireless Sensor Options	Air - Fi Wireless Communication Module

Accessory Options

Disconnect Switch	Disconnect switch
Power fuse	Power Fuse
Transformer	208/24 volt transformer

Heating Coil

Primary EDB	55.00 F
Room heating setpoint	68.00 F
Room heat loss	4.29 MBh
Unit LAT	89.97 F
Coil heating capacity	6.83 MBh
Electric heater voltage	208/1
Electric heater kilowatt	2.0
Electric heater stage	1
Electric heater control	24 volt magnetic contactors

Product Report - Variable Air Volume Single Duct Terminal Units
Item: A2 Qty: 2 Tag(s): VAV-1-4, VAV-2-8

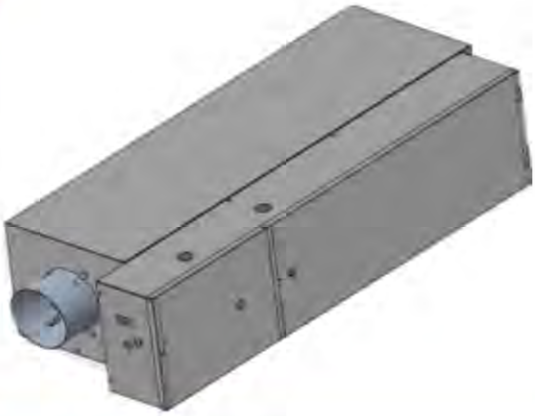
Variable Air Volume Single Duct

Unit Overview - VAV-1-4, VAV-2-8

Unit model	Primary inlet	Design cooling airflow	Min cooling airflow	Trane Supplied Controls
VCEF (Electric Heating)	8" (203mm)	900 cfm	350 cfm	SY210 DDC-Basic (Electric heat- staged)

Construction and Airflow

APD @ cooling airflow	0.100 in H2O
Cooling inlet velocity	2578 ft/min
Valve heating airflow	350 cfm
Unit Insulation	Dual wall with 1" insulation
Elevation	0.00 ft
Operating weight	49.0 lb
Air Leakage Class	Standard Air Leakage



Electrical

Full load amps	14.42 A
Max fuse size	20.00 A
Min circuit ampacity	18.03 A

Controls and Sensors

Actuator	Standard actuator
DTS & HW Valve Harness	Duct temperature sensor -factory mounted
Wireless Sensor Options	Air - Fi Wireless Communication Module

Accessory Options

Disconnect Switch	Disconnect switch
Power fuse	Power Fuse
Transformer	208/24 volt transformer

Heating Coil

Primary EDB	55.00 F
Room heating setpoint	68.00 F
Room heat loss	5.31 MBh
Unit LAT	81.98 F
Coil heating capacity	10.25 MBh
Electric heater voltage	208/1
Electric heater kilowatt	3.0
Electric heater stage	1
Electric heater control	24 volt magnetic contactors

Product Report - Variable Air Volume Single Duct Terminal Units
Item: A3 Qty: 4 Tag(s): VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7

Variable Air Volume Single Duct

Unit Overview - VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7

Unit model	Primary inlet	Design cooling airflow	Min cooling airflow	Trane Supplied Controls
VCEF (Electric Heating)	4" (102mm)	225 cfm	50 cfm	SY210 DDC-Basic (Electric heat- staged)

Construction and Airflow

APD @ cooling airflow	0.020 in H2O
Cooling inlet velocity	2578 ft/min
Valve heating airflow	83 cfm
Unit Insulation	Dual wall with 1" insulation
Elevation	0.00 ft
Operating weight	48.0 lb
Air Leakage Class	Standard Air Leakage

Electrical

Full load amps	4.81 A
Max fuse size	15.00 A
Min circuit ampacity	6.01 A

Controls and Sensors

Actuator	Standard actuator
DTS & HW Valve Harness	Duct temperature sensor -factory mounted
Wireless Sensor Options	Air - Fi Wireless Communication Module

Accessory Options

Disconnect Switch	Disconnect switch
Power fuse	Power Fuse
Transformer	208/24 volt transformer

Heating Coil

Primary EDB	55.00 F
Room heating setpoint	68.00 F
Room heat loss	2.24 MBh
Unit LAT	92.92 F
Coil heating capacity	3.42 MBh
Electric heater voltage	208/1
Electric heater kilowatt	1.0
Electric heater stage	1
Electric heater control	24 volt magnetic contactors

Product Report - Variable Air Volume Single Duct Terminal Units
Item: A4 Qty: 1 Tag(s): VAV-2-9

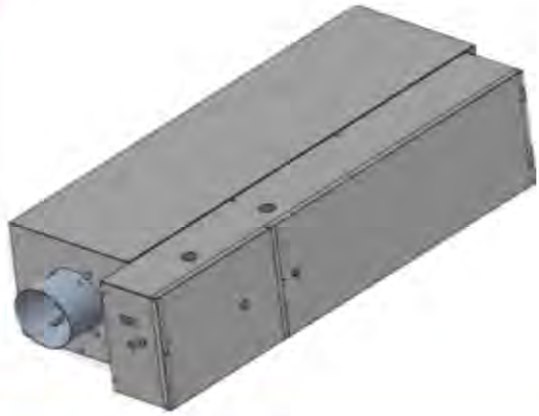
Variable Air Volume Single Duct

Unit Overview - VAV-2-9

Unit model	Primary inlet	Design cooling airflow	Min cooling airflow	Trane Supplied Controls
VCEF (Electric Heating)	5" (127mm)	350 cfm	120 cfm	SY210 DDC-Basic (Electric heat- staged)

Construction and Airflow

APD @ cooling airflow	0.020 in H2O
Cooling inlet velocity	2567 ft/min
Valve heating airflow	120 cfm
Unit Insulation	Dual wall with 1" insulation
Elevation	0.00 ft
Operating weight	48.0 lb
Air Leakage Class	Standard Air Leakage



Electrical

Full load amps	4.81 A
Max fuse size	15.00 A
Min circuit ampacity	6.01 A

Controls and Sensors

Actuator	Standard actuator
DTS & HW Valve Harness	Duct temperature sensor -factory mounted
Wireless Sensor Options	Air - Fi Wireless Communication Module

Accessory Options

Disconnect Switch	Disconnect switch
Power fuse	Power Fuse
Transformer	208/24 volt transformer

Heating Coil

Primary EDB	55.00 F
Room heating setpoint	68.00 F
Room heat loss	1.72 MBh
Unit LAT	81.23 F
Coil heating capacity	3.42 MBh
Electric heater voltage	208/1
Electric heater kilowatt	1.0
Electric heater stage	1
Electric heater control	24 volt magnetic contactors

Mechanical Specifications - Variable Air Volume Single Duct Terminal Units
Item: A1 - A4 Qty: 9 Tag(s): VAV-1-3, VAV-2-10, VAV-1-4, VAV-2-8, VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7, VAV-2-9

General Unit Information
The unit casing is comprised of 22 gauge galvanized steel. Outlet connection is slip and drive.
Agency Listing - The unit is UL and Canadian UL listed as a room air terminal unit. UL Control # 9N65. All Trane terminal units are AHRI 880 - 98 certified.

General Unit Clearance
Allow adequate clearance on control box side of unit to meet NEC. A minimum of one and one half duct diameters of straight duct work, upstream of the air inlet connection, must be present for optimum airflow measurement performance. Upstream duct work should be the same diameter as the primary inlet connection.

Dual Wall Insulation
1" Double-wall Insulation - The interior surface of the unit casing is acoustically and thermally lined with a 1", 1.0 lb composite density glass fiber with high density facing. The insulation R-value is 3.8. The insulation is UL listed and meets NFPA-90A and UL 181 standards. The insulation is covered by an interior liner made of 26-gage galvanized steel. All wire penetrations are covered by grommets. There are no exposed edges of insulation (complete metal encapsulation).

Air Valve Round
The air inlet connection is an 18 gauge galvanized steel cylinder sized to fit standard round duct. A multiple point, averaging flow sensing ring is provided with balancing taps for measuring within +/- 5% of unit cataloged airflow. An airflow versus pressure differential calibration chart is provided. The damper blade is constructed of a closed cell foam seal mechanically locked between two 22 gauge galvanized steel disks. The damper blade assembly is connected through a cast zinc stub axle and shaft supported by self lubricating bearings. The shaft is cast with a damper position indicator. The valve assembly includes a mechanical stop to prevent over stroking. At 4.0" w.g. air valve leakage does not exceed 1% of cataloged airflow.

Power Disconnect Switch (for VCEF)
A factory provided interlocking door disconnect switch located on the electric heater control panel.

Line Fuse - VCEF
For VCEF units, fuses provided on all energized lines of incoming power to interrupt circuit in overcurrent conditions.

Slip & Drive Connection
A slip and drive connection has two straight flanges on the top and bottom, and two drive connections on the left and right sides. This is a standard option on all VAV single duct terminal units.

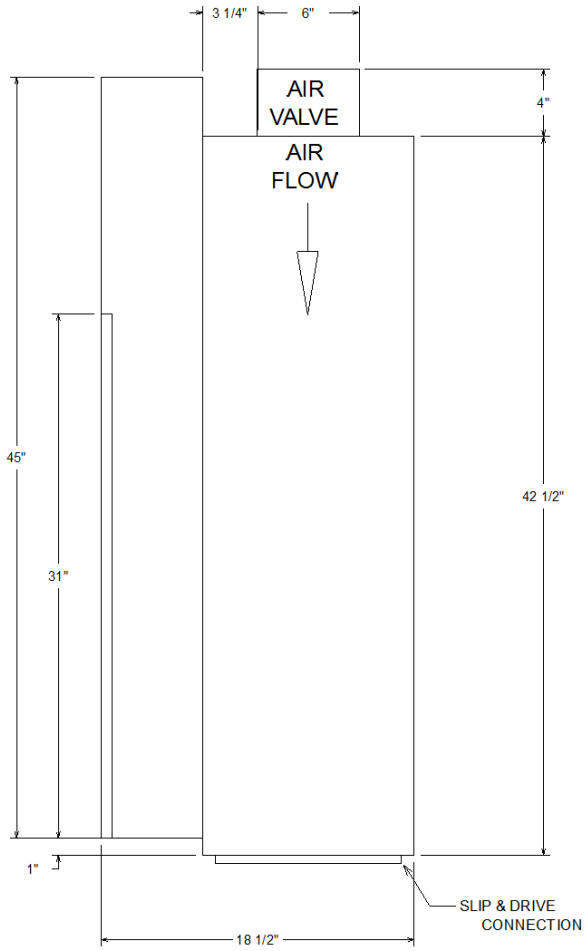
Electric Heat Coil
Factory provided and mounted resistance open-coil type heater with airflow switch, a disc-type automatic pilot duty thermal primary cutoff, and manually resettable pilot-duty thermal secondary cutoff with associated backup contactor. Heater element material is type C nickel-chromium alloy. The heater terminal box is provided with 7/8" knockouts for customer power supply. Terminal connections are plated steel with ceramic insulators. Unit is Flippable for both Left and Right hand control access, except with mercury contactor option.

Magnetic Contactor
An electric heater 24 volt contact for use with Direct Digital Control (D.D.C.) or Analog Electronic VAV Controls.

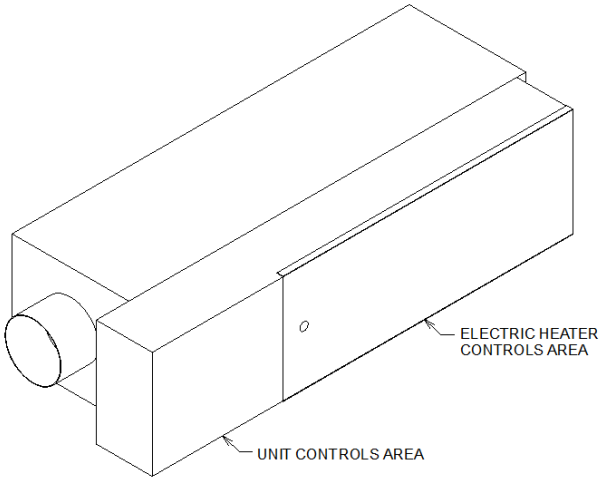
Electric Heat Transformer
A 50VA or 75VA class 2 transformer will be an integral component of the heater control panel dependent on unit load requirements to provide 24 VAC for controls.

D.D.C. Floating Point Actuator
Trane 3 wire, (open, close, common) 26GA when 6-pos amp connector is used for Tracer UC210, VV550, or VAV UCM, otherwise 18GA wires are used. 3.4 VA, 1.7W, 24 VAC, 50/60 Hz. Quarter turn control actuator with linkage release button. Actuator has a constant drive rate independent of load, a rated torque of 35 in-lb, a 90-second drive time and is non-spring return. Travel is terminated by end stops at fully opened and closed positions. An integral magnetic clutch eliminates motor stall. An integral 3 screw terminal block is provided for field wiring. Operating temperature 32.0 F to 125.0 F.

Dimensional Drawings - Variable Air Volume Single Duct Terminal Units
Item: A1 Qty: 2 Tag(s): VAV-1-3, VAV-2-10

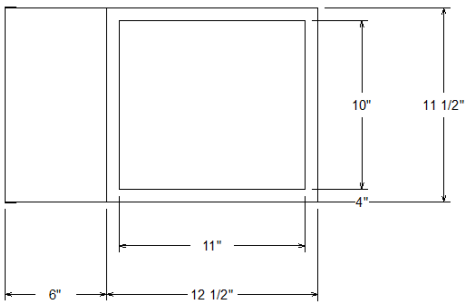


TOP VIEW



Customer Notes

1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation

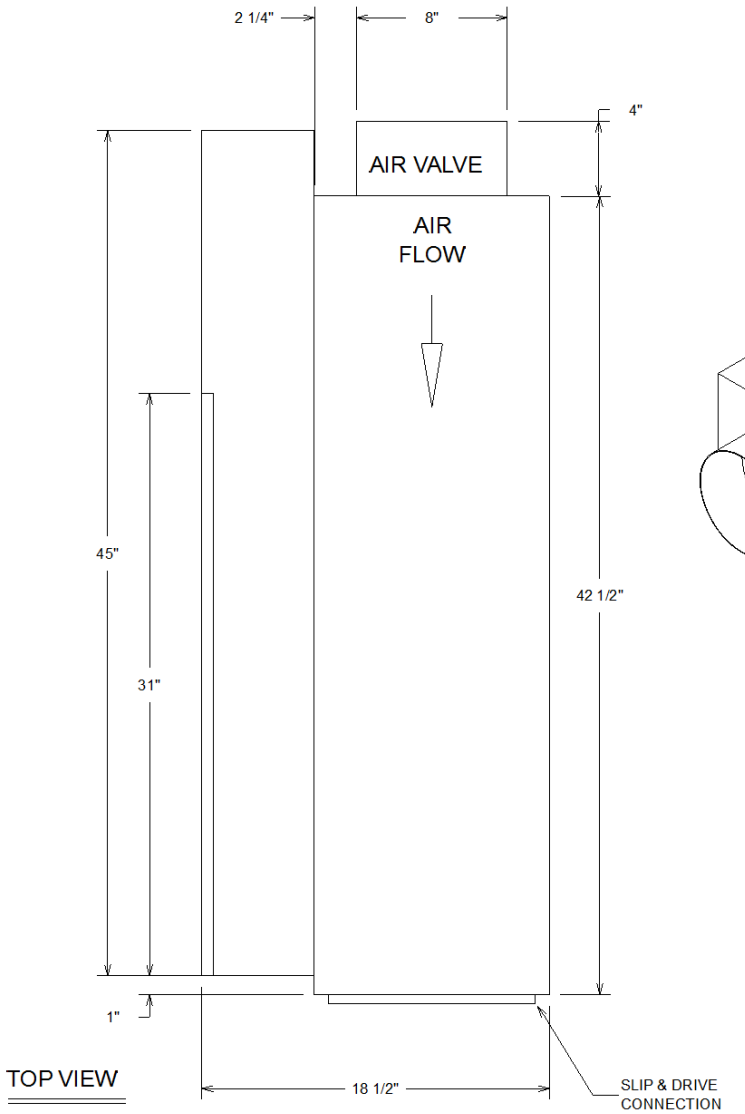


BACK VIEW

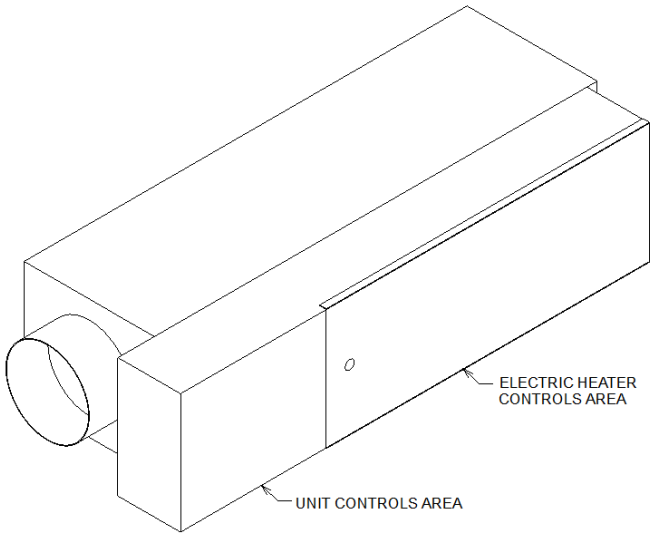
Approximate Dry Weight	48.0 lb

Weight reflected may vary 5 lbs(2.27kgs) based upon options selected.

Dimensional Drawings - Variable Air Volume Single Duct Terminal Units
Item: A2 Qty: 2 Tag(s): VAV-1-4, VAV-2-8



TOP VIEW



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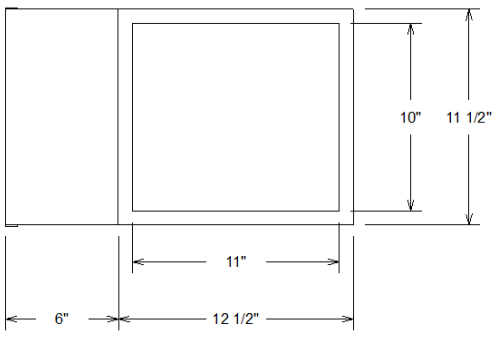
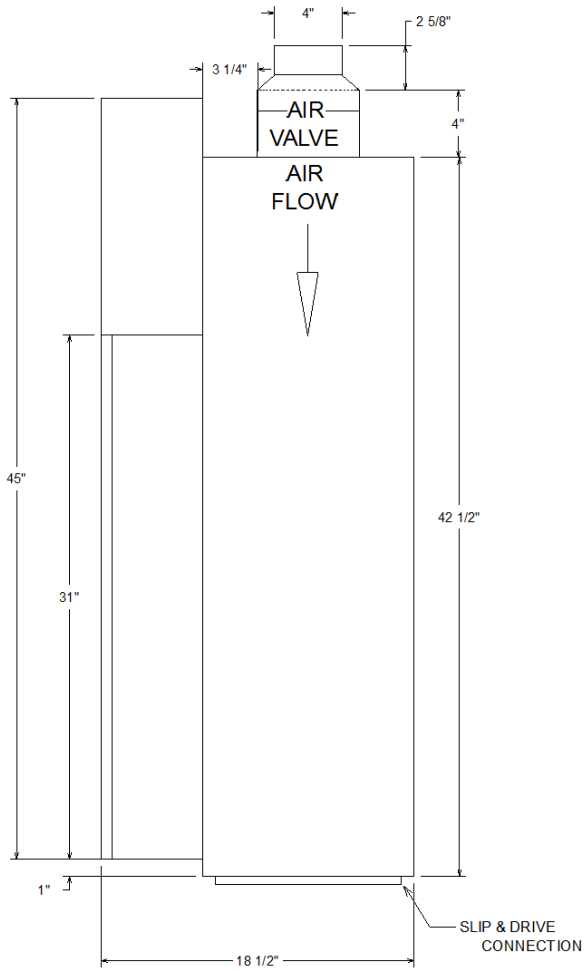


BACK VIEW

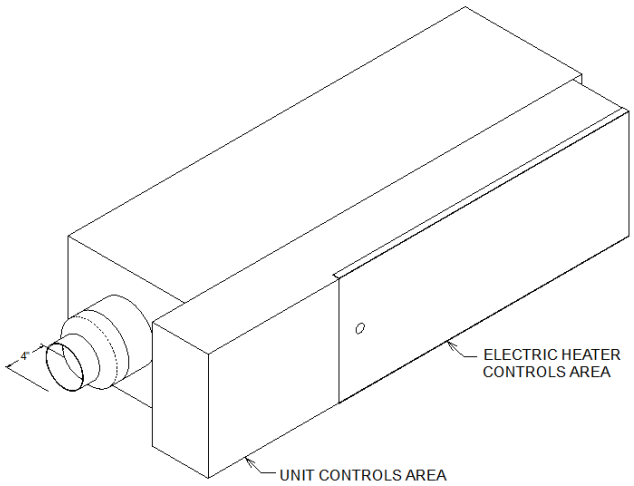
Approximate Dry Weight	49.0 lb

Weights reflected may vary ±5.0 lb based upon options selected.

Dimensional Drawings - Variable Air Volume Single Duct Terminal Units
Item: A3 Qty: 4 Tag(s): VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7

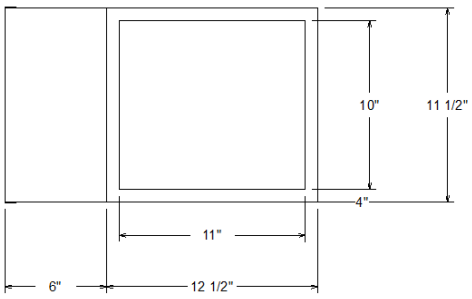


TOP VIEW



Customer Notes

1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation

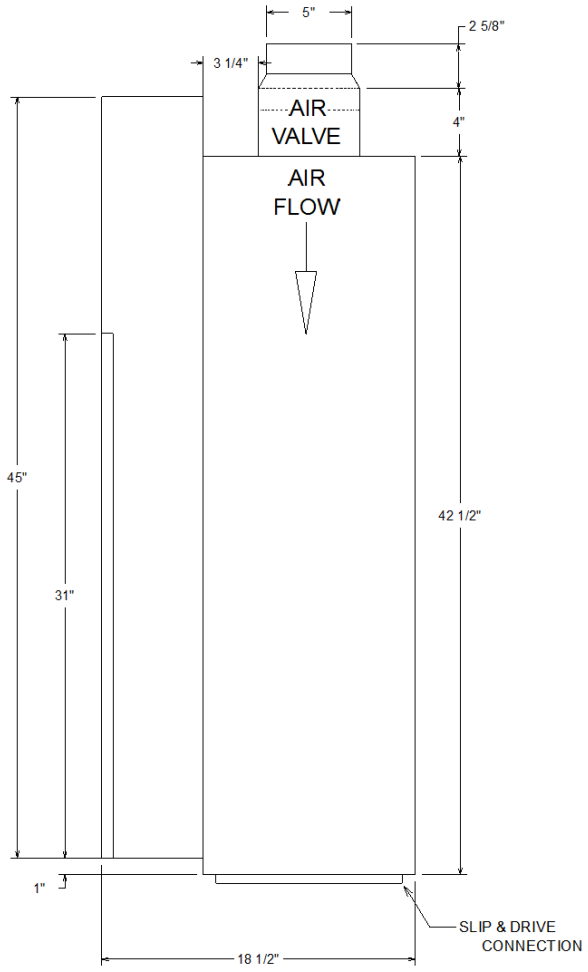


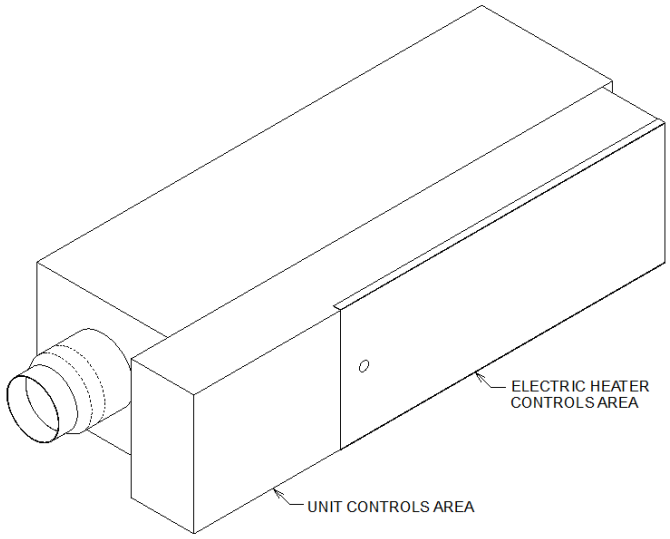
BACK VIEW

Approximate Dry Weight	48.0 lb

Weight reflected may vary 5 lbs(2.27kgs) based upon options selected.

Dimensional Drawings - Variable Air Volume Single Duct Terminal Units
Item: A4 Qty: 1 Tag(s): VAV-2-9

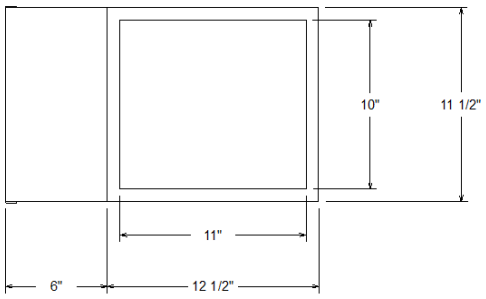




Customer Notes

1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation

TOP VIEW

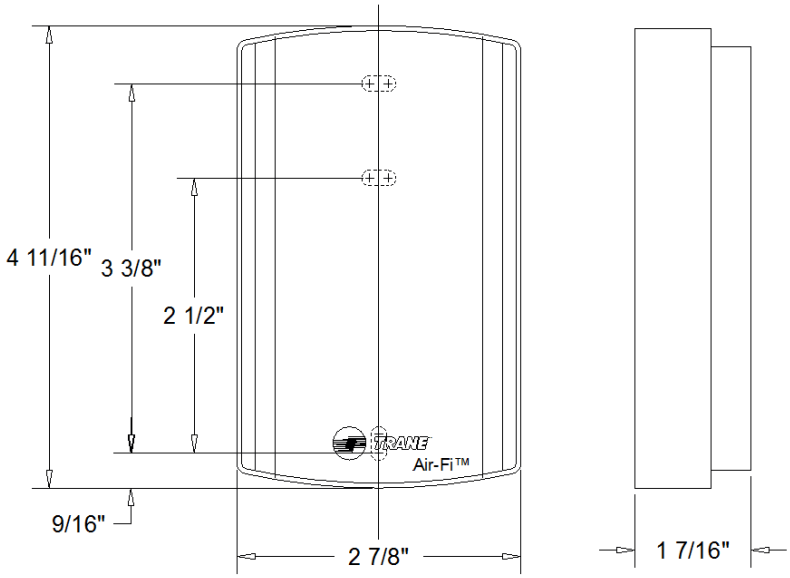


BACK VIEW

Approximate Dry Weight	48.0 lb

Weight reflected may vary 5 lbs(2.27kgs) based upon options selected.

Accessory - Variable Air Volume Single Duct Terminal Units
Item: A1 - A4 Qty: 9 Tag(s): VAV-1-3, VAV-2-10, VAV-1-4, VAV-2-8, VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7, VAV-2-9



Air-Fi™ WIRELESS COMMUNICATIONS INTERFACE (Air-Fi™WCI)

(INSTALLED, WIRED & TESTED ON UNIT)

Wireless specifications

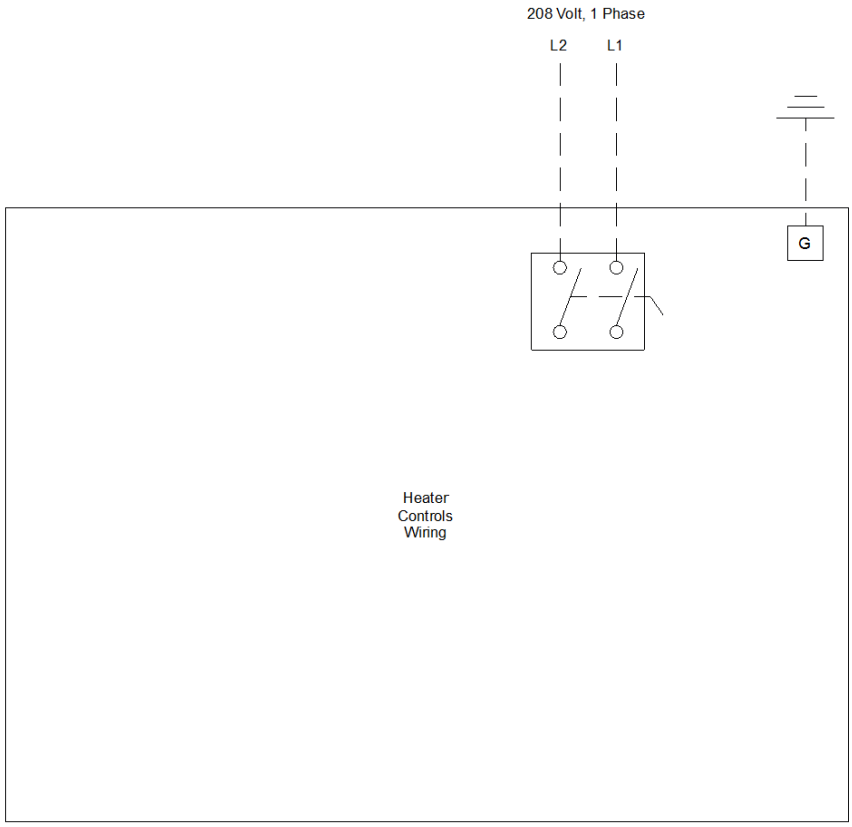
Air-Fi™ WCI works with other Air-Fi™ WCI's for wireless communications and optionally with wireless communications sensor.
(Does not work with non- Air-Fi™ Wireless Zone Sensors)

WCI operating temperature	-40 to 158ºF (-40 to 70ºC)
Storage temperature	-40 to 185ºF (-40 to 85°C)
Storage and operating humidity range	5 % to 95 % relative humidity (RH), non-condensing
Resolution	±0.125ºF over a range of 60 to 80ºF (15.56 to 26.67°C) ±0.25 ºF when outside this range
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	<2.5VA
Housing Material	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	Factory mounted on exterior of control box.
Range(i)	Open range - 2,500 ft (762m) w/ packet error rate of 2 % Indoor: Typical range is 200ft (61mm); actual range is dependent on the environment.
Output power	100 mW - North America
Radio frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	00-99
RoHS compliance	Yes
Agency Listing	UL Listed: UL94, 5VA flammability rating and UL916. CSA - C22.2 No. 205-M1983 Signal Equipment

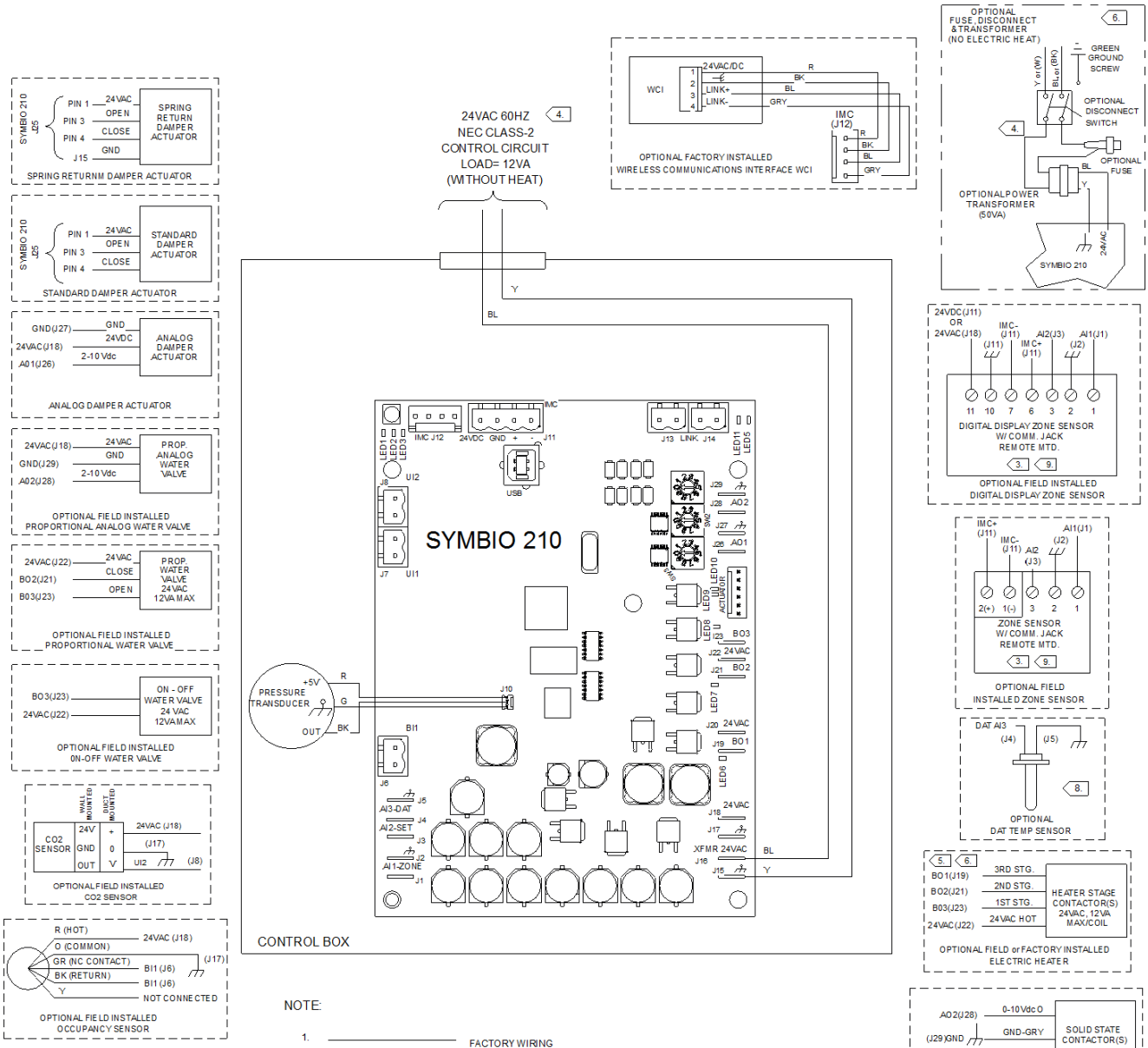
(i) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.

Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.

Field Wiring - Variable Air Volume Single Duct Terminal Units
Item: A1 - A4 Qty: 9 Tag(s): VAV-1-3, VAV-2-10, VAV-1-4, VAV-2-8, VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7, VAV-2-9

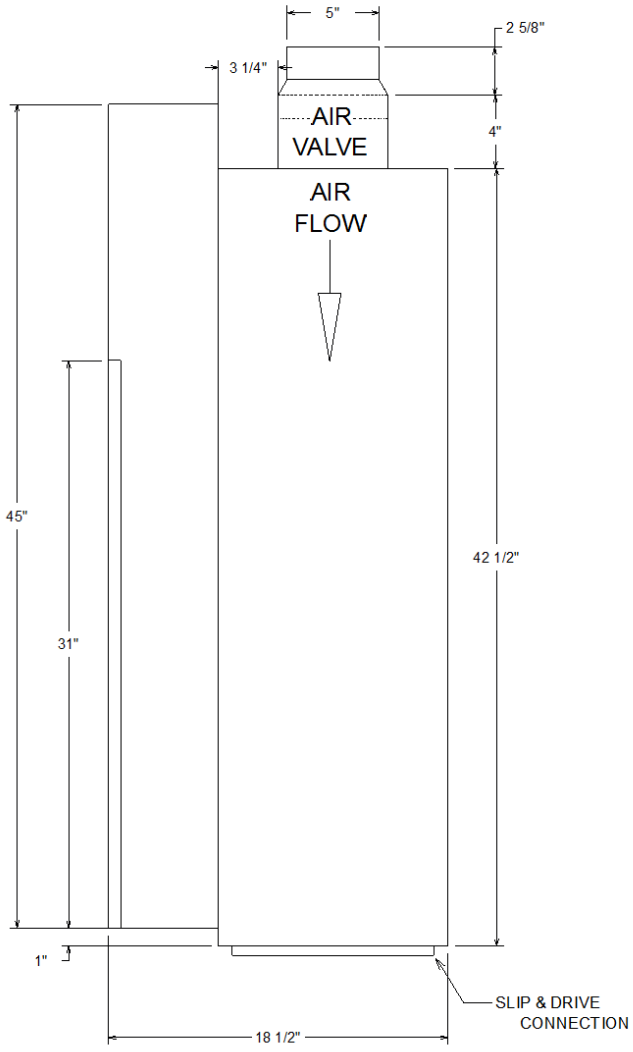


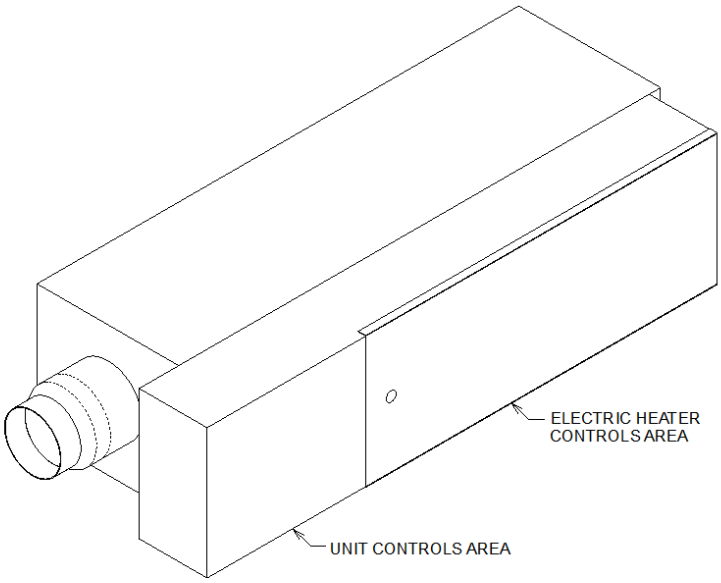
Field Wiring - Variable Air Volume Single Duct Terminal Units
Item: A1 - A4 Qty: 9 Tag(s): VAV-1-3, VAV-2-10, VAV-1-4, VAV-2-8, VAV-2-4, VAV-2-5, VAV-2-6, VAV-2-7, VAV-2-9



NOTE:

1. FACTORY WIRING
   FIELD WIRING
   OPTIONAL OR ALTERNATE WIRING
2. BARE WIRE ENDS OR 1/4" QUICK CONNECT TERMINALS REQUIRED FOR ALL FIELD CONNECTIONS.
3. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
4. IF UNIT MOUNTED TRANFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO J15.
5. CONTACTORS ARE 24VAC: 10VA MAX/COIL (MAGNETIC CONTACTORS).
6. OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER LOCATED IN CONTROL BOX FOR COOLING & HOT WATER UNITS. LOCATED IN HEATER ON ELECTRIC HEAT UNITS.
   TRANSFORMER WIRE COLORS: 120V-W, 208V-R, 240V-O, 277V-BR, 480V-R/BK, 575V-R, 190V-R, 220V-R, 347-R.
7. SCREW TERMINAL ADAPTERS REQUIRED FOR BI1, UI1, UI2, IMC & LINK.
8. TO USE AI3 WITH A SUPPLY AIR SENSOR FOR AUTO-CHANGEOVER, REASSIGNMENT OF AI3 TO SAT WITH TU IS REQUIRED.
9. ZONE SENSOR IMC TERMINALS REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.
10. 24Vdc REQUIRED FOR TRANE SCR ELECTRIC HEAT MODULE.

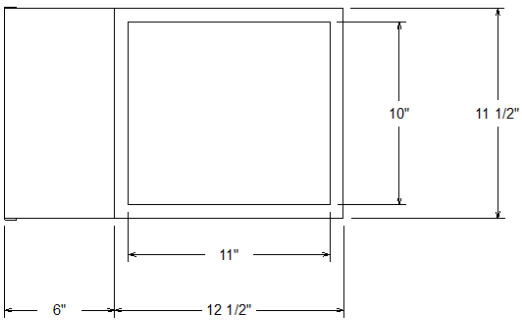




Customer Notes

1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation

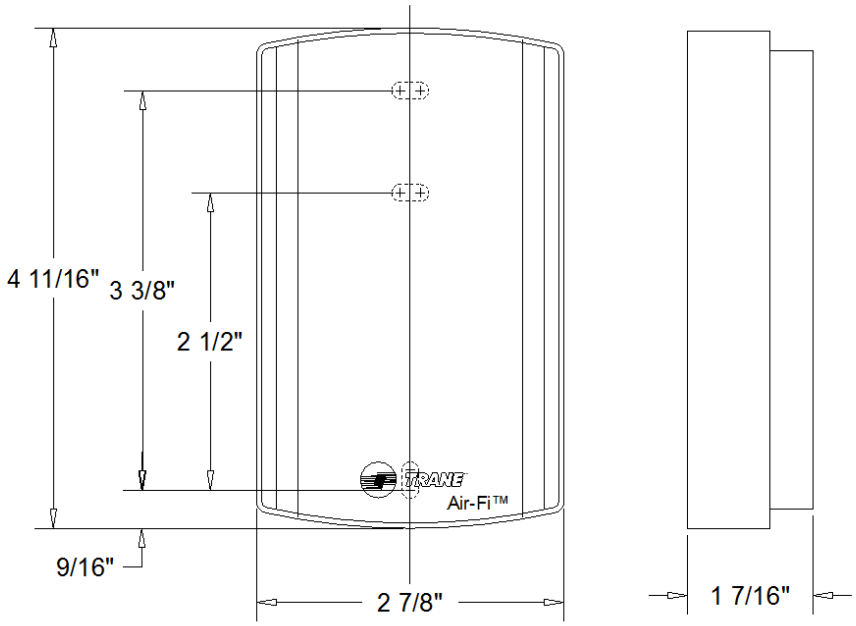
TOP VIEW



BACK VIEW

Approximate Dry Weight	48.0 lb

Weight reflected may vary 5 lbs(2.27kgs) based upon options selected.



Air-Fi™ WIRELESS COMMUNICATIONS INTERFACE (Air-Fi™WCI)

(INSTALLED, WIRED & TESTED ON UNIT)

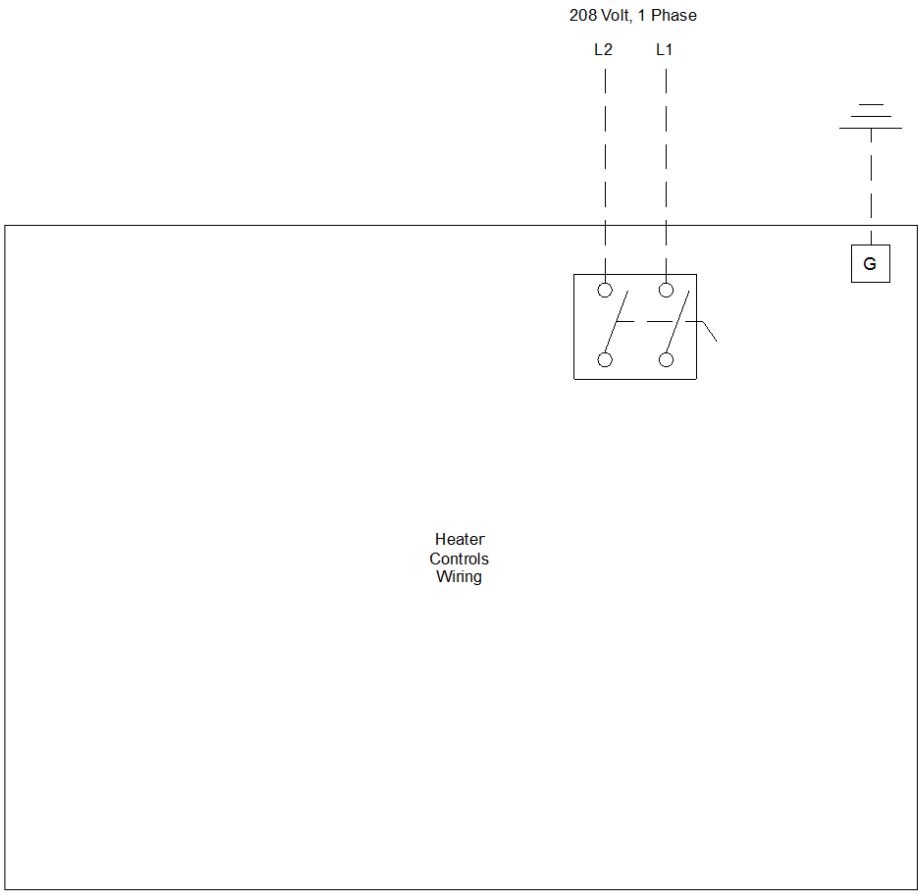
Wireless specifications

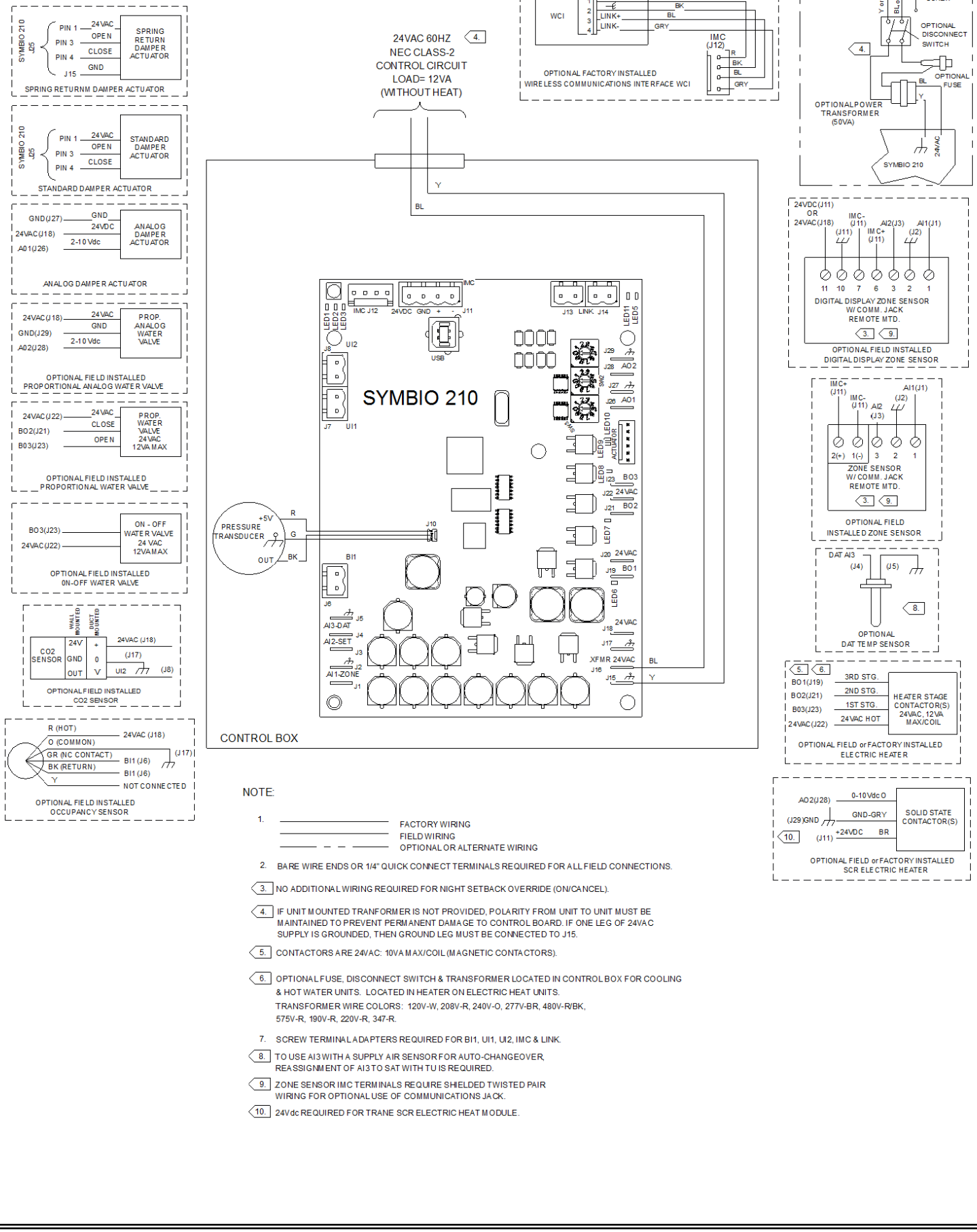
Air-Fi™ WCI works with other Air-Fi™ WCI's for wireless communications and optionally with wireless communications sensor.
(Does not work with non- Air-Fi™ Wireless Zone Sensors)

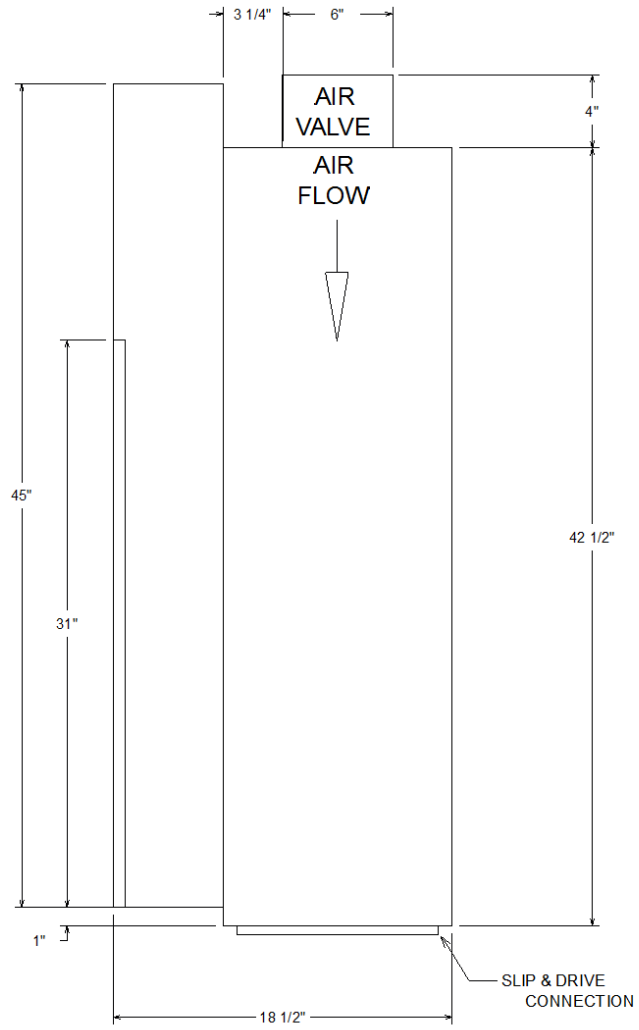
WCI operating temperature	-40 to 158ºF (-40 to 70ºC)
Storage temperature	-40 to 185ºF (-40 to 85°C)
Storage and operating humidity range	5 % to 95 % relative humidity (RH), non-condensing
Resolution	±0.125ºF over a range of 60 to 80ºF (15.56 to 26.67°C) ±0.25 ºF when outside this range
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	<2.5VA
Housing Material	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	Factory mounted on exterior of control box.
Range(i)	Open range - 2,500 ft (762m) w/ packet error rate of 2 % Indoor: Typical range is 200ft (61mm); actual range is dependent on the environment.
Output power	100 mW - North America
Radio frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	00-99
RoHS compliance	Yes
Agency Listing	UL Listed: UL94, 5VA flammability rating and UL916. CSA - C22.2 No. 205-M1983 Signal Equipment

(i) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.

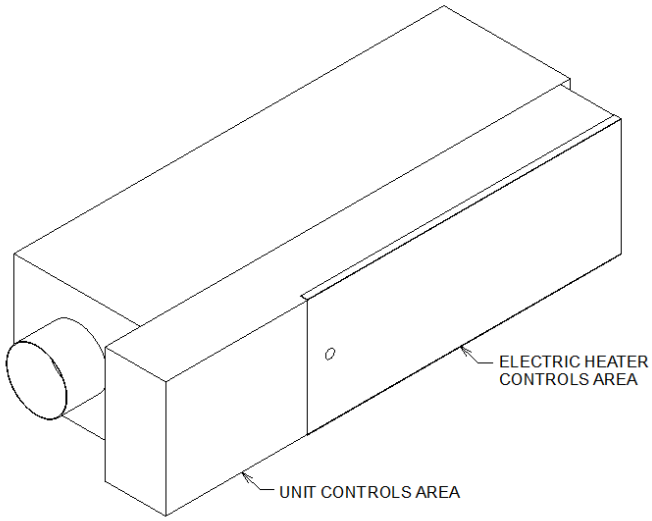
Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.


208 Volt, 1 Phase
L2
L1
G
Heater
Controls
Wiring


SYMBIO 210 J25
PIN 1
PIN 3
PIN 4
J15
24VAC
OPEN
CLOSE
GND
SPRING RETURN DAMPER ACTUATOR
SPRING RETURNM DAMPER ACTUATOR
STANDARD DAMPER ACTUATOR
GND(J27)
24VAC(J18)
A01(J26)
2-10 Vdc
ANALOG DAMPER ACTUATOR
A02(J28)
PROP. ANALOG WATER VALVE
OPTIONAL FIELD INSTALLED PROPORTIONAL ANALOG WATER VALVE
BO2(J21)
BO3(J23)
PROP. WATER VALVE 24VAC 12VA MAX
OPTIONAL FIELD INSTALLED PROPORTIONAL WATER VALVE
ON - OFF WATER VALVE 24 VAC 12VA MAX
OPTIONAL FIELD INSTALLED ON-OFF WATER VALVE
CO2 SENSOR
WALL MOUNTED
DUCT MOUNTED
24V
GND
OUT
UI2
OPTIONAL FIELD INSTALLED CO2 SENSOR
R (HOT)
O (COMMON)
GR (NC CONTACT)
BK (RETURN)
Y
BI1 (J6)
NOT CONNECTED
OPTIONAL FIELD INSTALLED OCCUPANCY SENSOR
24VAC 60HZ
NEC CLASS-2
CONTROL CIRCUIT
LOAD= 12VA
(WITHOUT HEAT)
WCI
24VAC/DC
LINK+
LINK-
IMC (J12)
OPTIONAL FACTORY INSTALLED WIRELESS COMMUNICATIONS INTERFACE WCI
OPTIONAL FUSE, DISCONNECT &TRANSFORMER (NO ELECTRIC HEAT)
GREEN GROUND SCREW
OPTIONAL DISCONNECT SWITCH
OPTIONAL FUSE
OPTIONAL POWER TRANSFORMER (50VA)
SYMBIO 210
24VDC(J11) OR 24VAC(J18)
IMC-(J11)
IMC+(J11)
AI2(J3)
AI1(J1)
(J2)
11 10 7 6 3 2 1
DIGITAL DISPLAY ZONE SENSOR W/ COMM. JACK REMOTE MTD.
OPTIONAL FIELD INSTALLED DIGITAL DISPLAY ZONE SENSOR
2(+) 1(-) 3 2 1
ZONE SENSOR W/ COMM. JACK REMOTE MTD.
OPTIONAL FIELD INSTALLED ZONE SENSOR
DAT AI3
(J4)
(J5)
OPTIONAL DAT TEMP SENSOR
BO1(J19)
BO2(J21)
BO3(J23)
24VAC(J22)
3RD STG.
2ND STG.
1ST STG.
24VAC HOT
HEATER STAGE CONTACTOR(S) 24VAC, 12VA MAX/COIL
OPTIONAL FIELD or FACTORY INSTALLED ELECTRIC HEATER
AO2(J28)
(J29)GND
(J11)
0-10Vdc O
GND-GRY
+24VDC BR
SOLID STATE CONTACTOR(S)
OPTIONAL FIELD or FACTORY INSTALLED SCR ELECTRIC HEAT MODULE
CONTROL BOX
SYMBIO 210
IMC J12
24VDC GND + -
J11
USB
J13 LINK J14
LED1 LED2 LED3
LED11 LED5
UI2
J8
J7
UI1
J29
AO2
J28
SW2
J27
AO1
J26
LED9
LED8
LED10
J23
BO3
J22
24VAC
J21
BO2
LED7
J20
24VAC
J19
BO1
LED6
J18
24VAC
J17
XFMR 24VAC
J16
J15
BI1
J6
AI3-DAT
J5
AI2-SET
J4
AI1-ZONE
J3
J2
J1
PRESSURE TRANSDUCER
+5V
OUT
R
G
BK
J10
BL
Y
NOTE:
1. FACTORY WIRING
FIELD WIRING
OPTIONAL OR ALTERNATE WIRING
2. BARE WIRE ENDS OR 1/4" QUICK CONNECT TERMINALS REQUIRED FOR ALL FIELD CONNECTIONS.
3. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
4. IF UNIT MOUNTED TRANFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO J15.
5. CONTACTORS ARE 24VAC: 10VA MAX/COIL (MAGNETIC CONTACTORS).
6. OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER LOCATED IN CONTROL BOX FOR COOLING & HOT WATER UNITS. LOCATED IN HEATER ON ELECTRIC HEAT UNITS.
TRANSFORMER WIRE COLORS: 120V-W, 208V-R, 240V-O, 277V-BR, 480V-R/BK, 575V-R, 190V-R, 220V-R, 347-R.
7. SCREW TERMINAL ADAPTERS REQUIRED FOR BI1, UI1, UI2, IMC & LINK.
8. TO USE AI3 WITH A SUPPLY AIR SENSOR FOR AUTO-CHANGEOVER, REASSIGNMENT OF AI3 TO SAT WITH TU IS REQUIRED.
9. ZONE SENSOR IMC TERMINALS REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.
10. 24Vdc REQUIRED FOR TRANE SCR ELECTRIC HEAT MODULE.

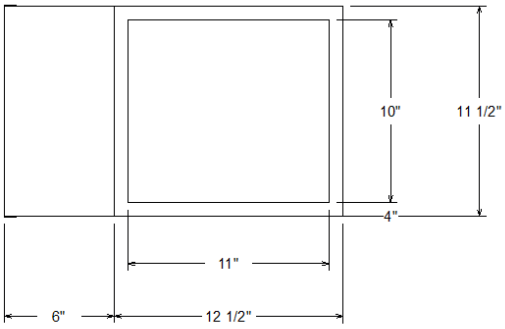


TOP VIEW



Customer Notes

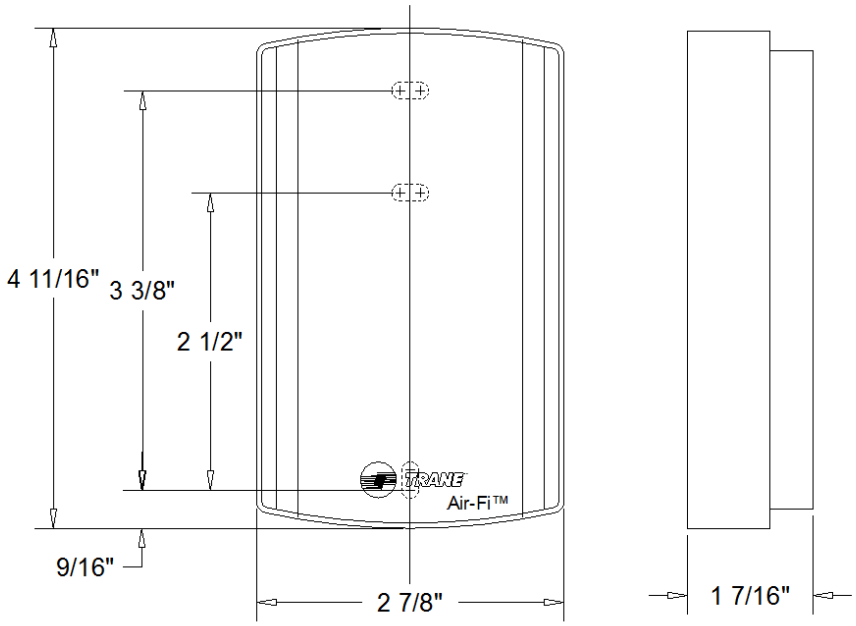
1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation



BACK VIEW

Approximate Dry Weight	48.0 lb

Weight reflected may vary 5 lbs(2.27kgs) based upon options selected.



Air-Fi™ WIRELESS COMMUNICATIONS INTERFACE (Air-Fi™WCI)

(INSTALLED, WIRED & TESTED ON UNIT)

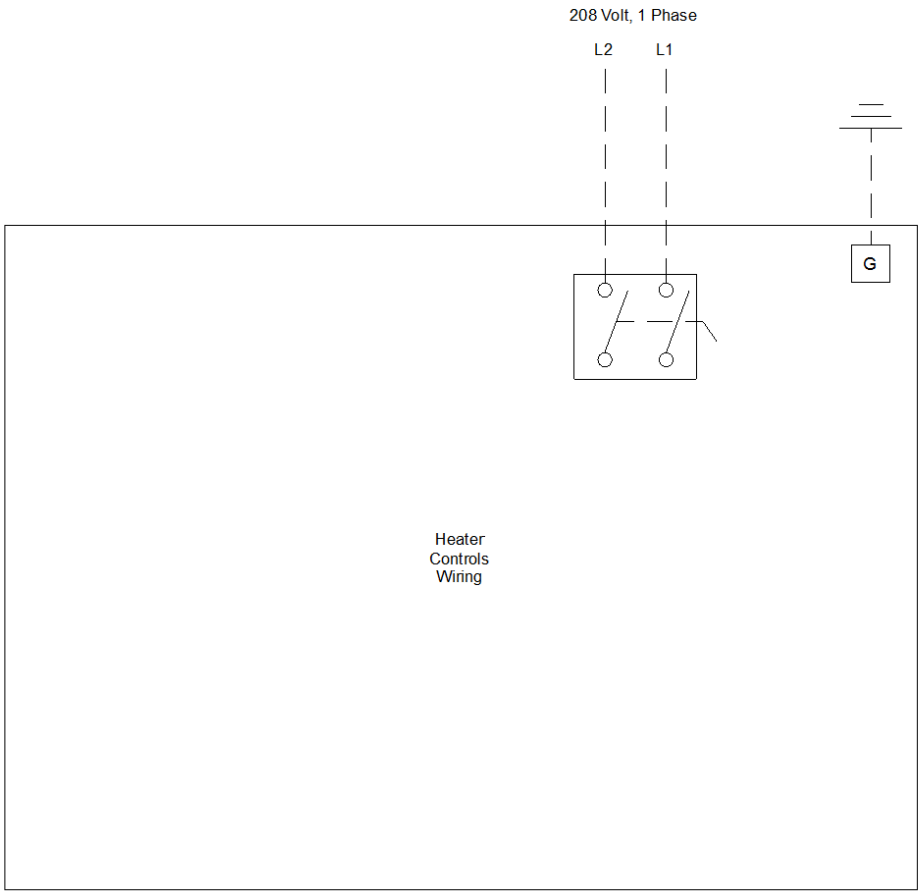
Wireless specifications

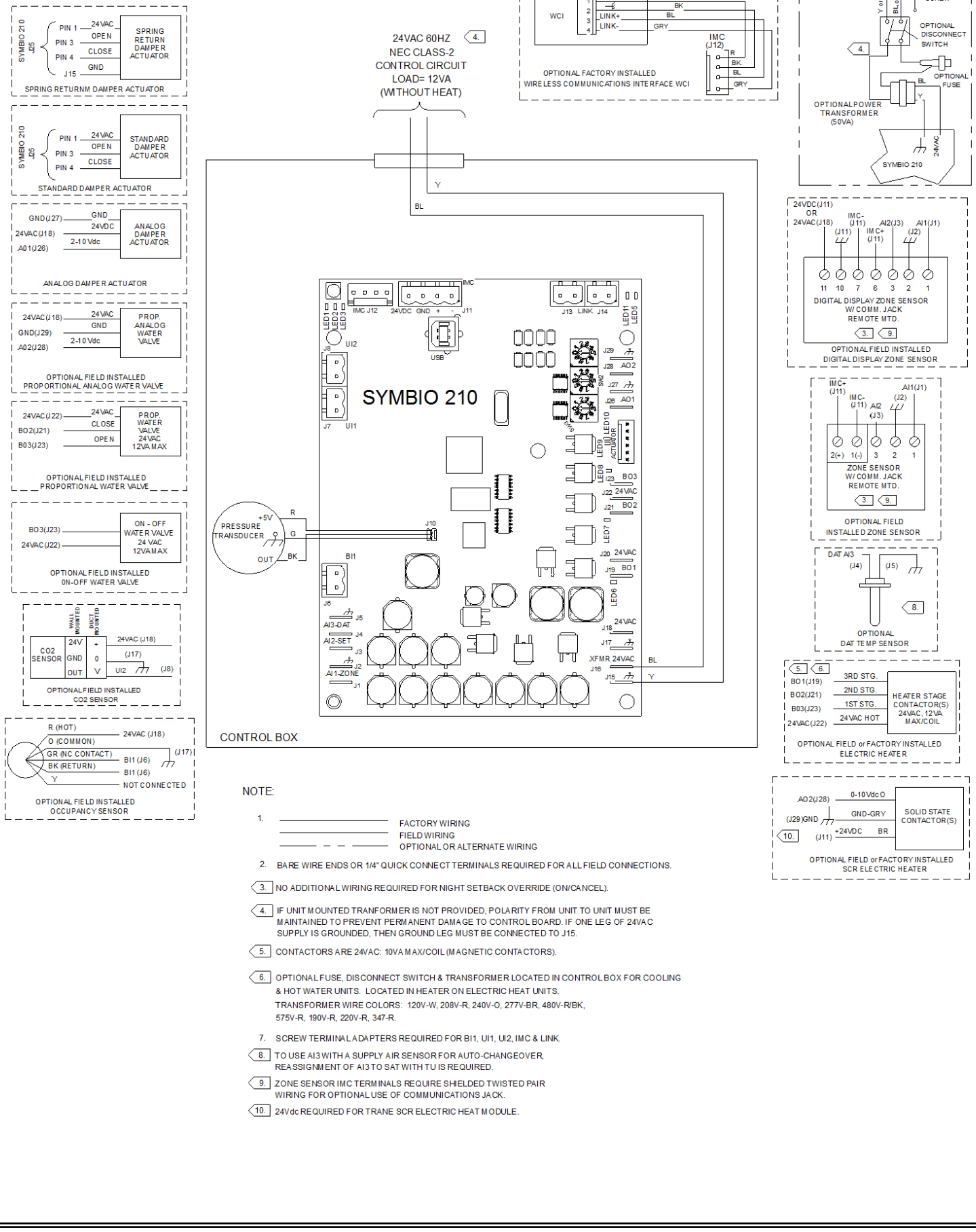
Air-Fi™ WCI works with other Air-Fi™ WCI's for wireless communications and optionally with wireless communications sensor.
(Does not work with non- Air-Fi™ Wireless Zone Sensors)

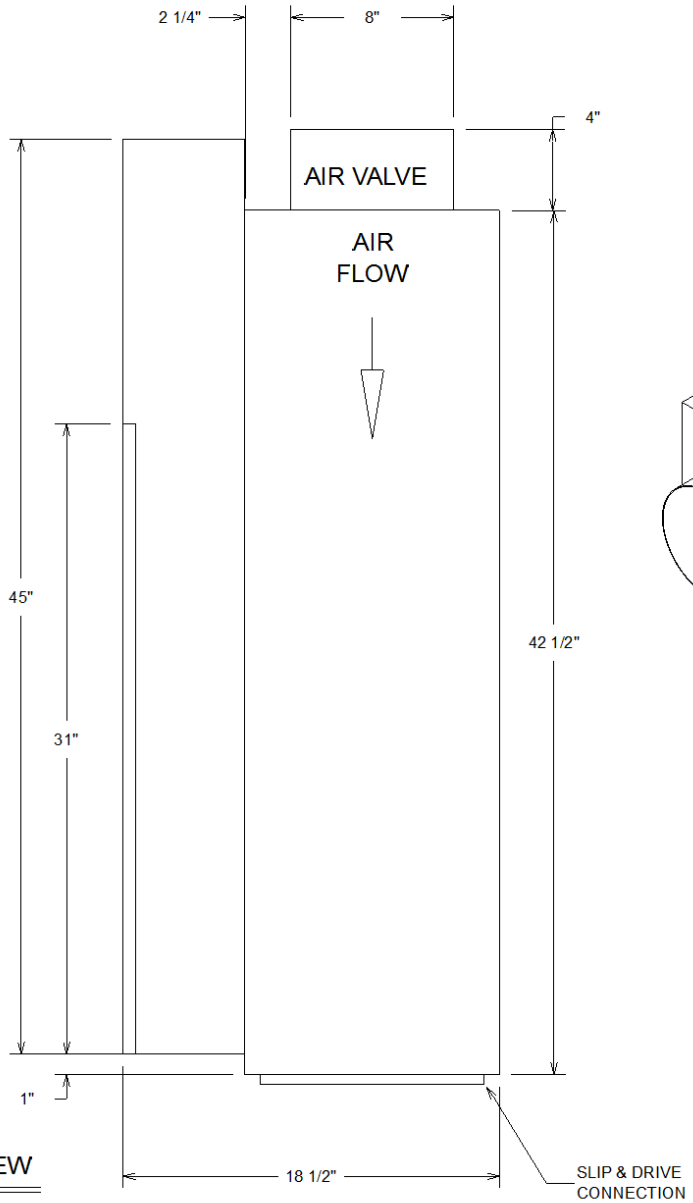
WCI operating temperature	-40 to 158ºF (-40 to 70ºC)
Storage temperature	-40 to 185ºF (-40 to 85°C)
Storage and operating humidity range	5 % to 95 % relative humidity (RH), non-condensing
Resolution	±0.125ºF over a range of 60 to 80ºF (15.56 to 26.67°C) ±0.25 ºF when outside this range
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	<2.5VA
Housing Material	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	Factory mounted on exterior of control box.
Range(i)	Open range - 2,500 ft (762m) w/ packet error rate of 2 % Indoor: Typical range is 200ft (61mm); actual range is dependent on the environment.
Output power	100 mW - North America
Radio frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	00-99
RoHS compliance	Yes
Agency Listing	UL Listed: UL94, 5VA flammability rating and UL916. CSA - C22.2 No. 205-M1983 Signal Equipment

(i) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.

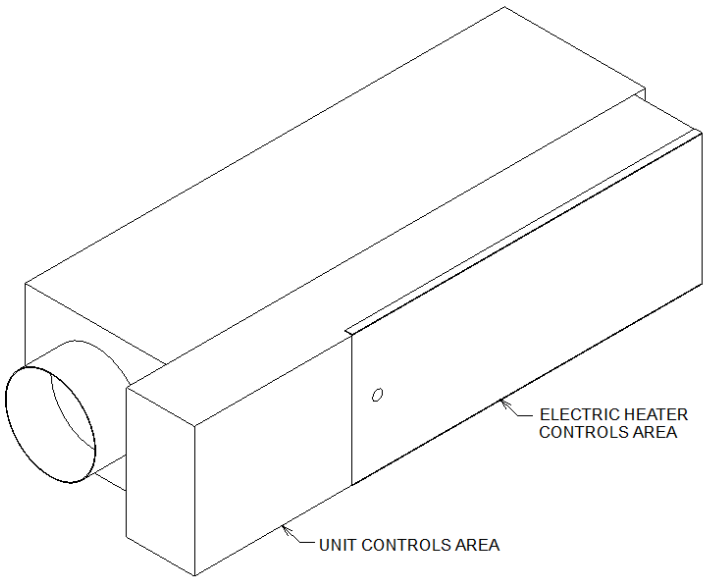
Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.


208 Volt, 1 Phase
L2
L1
G
Heater
Controls
Wiring


SYMBIO 210 J25
PIN 1
PIN 3
PIN 4
J15
24VAC
OPEN
CLOSE
GND
SPRING RETURN DAMPER ACTUATOR
SPRING RETURNM DAMPER ACTUATOR
STANDARD DAMPER ACTUATOR
GND(J27)
24VAC(J18)
A01(J26)
2-10 Vdc
ANALOG DAMPER ACTUATOR
A02(J28)
PROP. ANALOG WATER VALVE
OPTIONAL FIELD INSTALLED PROPORTIONAL ANALOG WATER VALVE
BO2(J21)
BO3(J23)
PROP. WATER VALVE 24VAC 12VA MAX
OPTIONAL FIELD INSTALLED PROPORTIONAL WATER VALVE
ON - OFF WATER VALVE 24 VAC 12VA MAX
OPTIONAL FIELD INSTALLED ON-OFF WATER VALVE
WALL MOUNTED
DUCT MOUNTED
CO2 SENSOR
24V
GND
OUT
0
V
UI2
(J8)
(J17)
OPTIONAL FIELD INSTALLED CO2 SENSOR
R (HOT)
O (COMMON)
GR (NC CONTACT)
BK (RETURN)
Y
BI1 (J6)
NOT CONNECTED
OPTIONAL FIELD INSTALLED OCCUPANCY SENSOR
24VAC 60HZ
NEC CLASS-2
CONTROL CIRCUIT
LOAD= 12VA
(WITHOUT HEAT)
4.
WCI
24VAC/DC
LINK+
LINK-
IMC (J12)
OPTIONAL FACTORY INSTALLED WIRELESS COMMUNICATIONS INTERFACE WCI
OPTIONAL FUSE, DISCONNECT &TRANSFORMER (NO ELECTRIC HEAT)
6.
GREEN GROUND SCREW
OPTIONAL DISCONNECT SWITCH
OPTIONAL FUSE
OPTIONAL POWER TRANSFORMER (50VA)
24VAC
SYMBIO 210
24VDC(J11) OR 24VAC(J18)
IMC- (J11)
IMC+ (J11)
AI2(J3)
AI1(J1)
(J2)
11 10 7 6 3 2 1
DIGITAL DISPLAY ZONE SENSOR W/ COMM. JACK REMOTE MTD.
3. 9.
OPTIONAL FIELD INSTALLED DIGITAL DISPLAY ZONE SENSOR
2(+) 1(-) 3 2 1
ZONE SENSOR W/ COMM. JACK REMOTE MTD.
OPTIONAL FIELD INSTALLED ZONE SENSOR
DAT AI3
(J4)
(J5)
8.
OPTIONAL DAT TEMP SENSOR
5. 6.
BO1(J19)
BO2(J21)
BO3(J23)
24VAC(J22)
3RD STG.
2ND STG.
1ST STG.
24VAC HOT
HEATER STAGE CONTACTOR(S) 24VAC, 12VA MAX/COIL
OPTIONAL FIELD or FACTORY INSTALLED ELECTRIC HEATER
AO2(J28)
0-10Vdc O
GND-GRY
(J29)GND
10.
(J11)
+24VDC
BR
SOLID STATE CONTACTOR(S)
OPTIONAL FIELD or FACTORY INSTALLED SCR ELECTRIC HEATER
CONTROL BOX
SYMBIO 210
IMC
IMC J12
24VDC GND + - J11
USB
J13 LINK J14
LED1 LED2 LED3
LED11 LED5
UI2
J8
J7
UI1
J29
AO2
J28
SW2
J27
AO1
J26
LED9
LED8
LED10
UI3
ACTIVITY
J23
BO3
J22
24VAC
J21
BO2
LED7
J20
24VAC
J19
BO1
LED6
J18
24VAC
J17
XFMR 24VAC
J16
J15
BL
Y
PRESSURE TRANSDUCER
+5V
R
G
OUT
BK
J10
BI1
J6
J5
AI3-DAT
J4
AI2-SET
J3
AI1-ZONE
J2
J1
R
BK
BL
GRY
Y
BL
NOTE:
1. FACTORY WIRING
FIELD WIRING
OPTIONAL OR ALTERNATE WIRING
2. BARE WIRE ENDS OR 1/4" QUICK CONNECT TERMINALS REQUIRED FOR ALL FIELD CONNECTIONS.
3. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
4. IF UNIT MOUNTED TRANFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO J15.
5. CONTACTORS ARE 24VAC: 10VA MAX/COIL (MAGNETIC CONTACTORS).
6. OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER LOCATED IN CONTROL BOX FOR COOLING & HOT WATER UNITS. LOCATED IN HEATER ON ELECTRIC HEAT UNITS.
TRANSFORMER WIRE COLORS: 120V-W, 208V-R, 240V-O, 277V-BR, 480V-R/BK, 575V-R, 190V-R, 220V-R, 347-R.
7. SCREW TERMINAL ADAPTERS REQUIRED FOR BI1, UI1, UI2, IMC & LINK.
8. TO USE AI3 WITH A SUPPLY AIR SENSOR FOR AUTO-CHANGEOVER, REASSIGNMENT OF AI3 TO SAT WITH TU IS REQUIRED.
9. ZONE SENSOR IMC TERMINALS REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.
10. 24Vdc REQUIRED FOR TRANE SCR ELECTRIC HEAT MODULE.

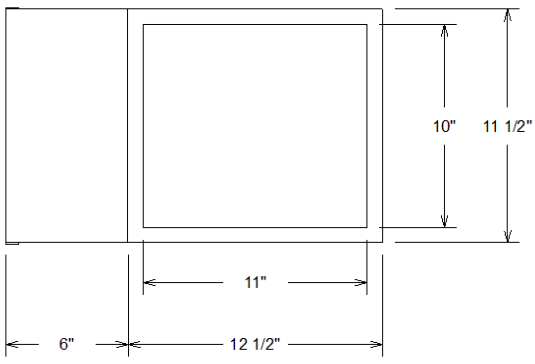


TOP VIEW



Customer Notes

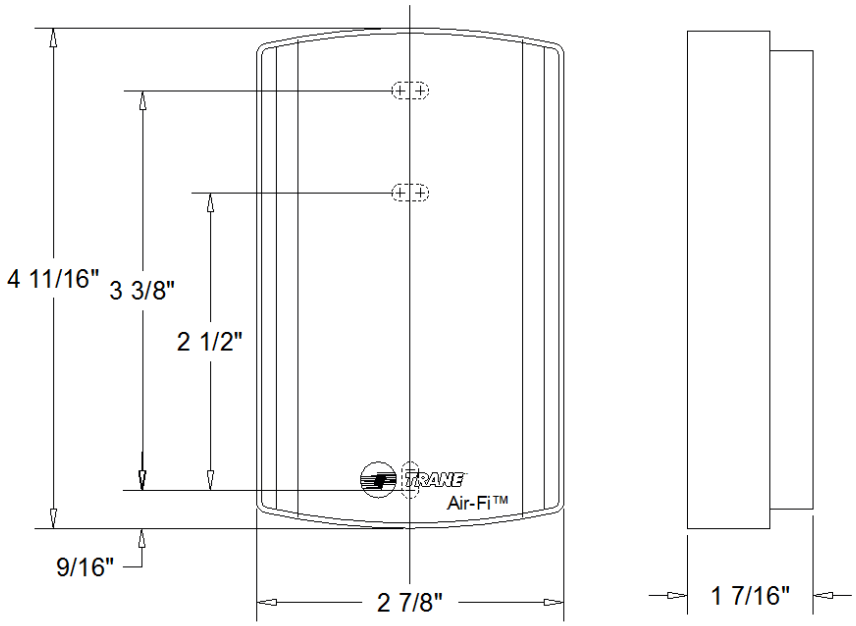
1. Air Inlet is centered in unit front panel.
2. Slip & Drive discharge outlet standard.
3. Minimum of 1.5 times duct diameter of straight duct at inlet for proper flow reading.
4. For electric heater access, side hinged door must have minimum distance per NEC or local code.
5. Allow 48" of straight duct downstream of unit before first runout & inside of the duct should be equal discharge size. (A & B)
6. Left-hand orientation shown. (Facing discharge) Unit can be flipped to right-hand orientation



BACK VIEW

Approximate Dry Weight	49.0 lb

Weights reflected may vary ±5.0 lb based upon options selected.



Air-Fi™ WIRELESS COMMUNICATIONS INTERFACE (Air-Fi™WCI)

(INSTALLED, WIRED & TESTED ON UNIT)

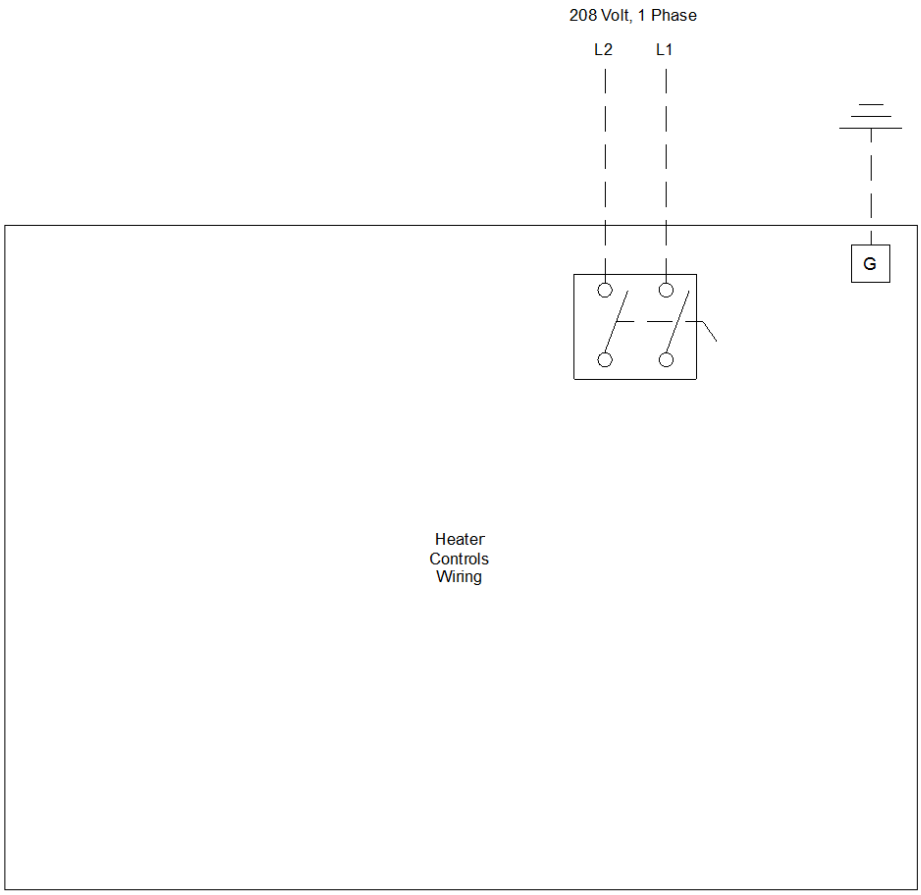
Wireless specifications

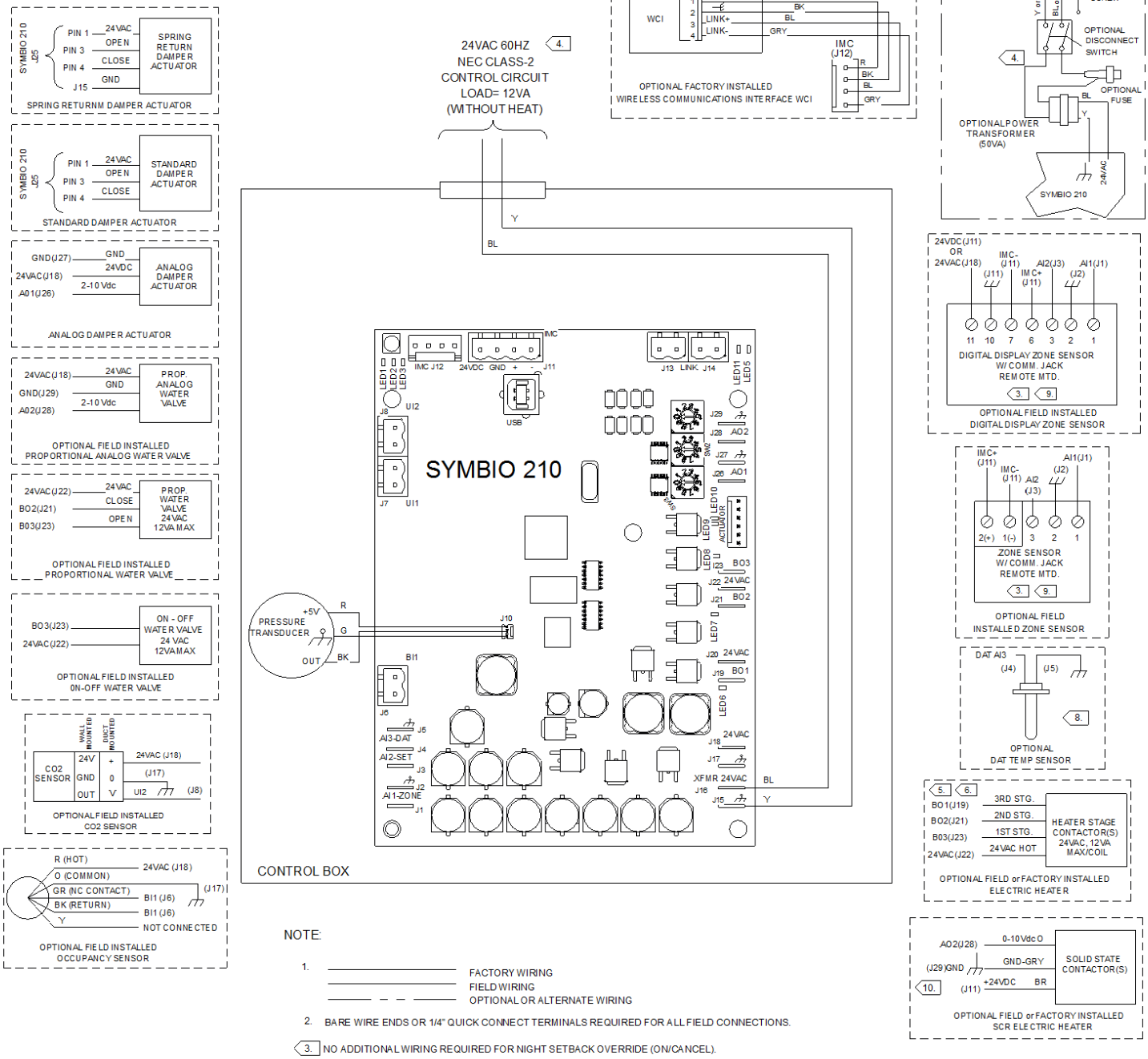
Air-Fi™ WCI works with other Air-Fi™ WCI's for wireless communications and optionally with wireless communications sensor.
(Does not work with non- Air-Fi™ Wireless Zone Sensors)

WCI operating temperature	-40 to 158ºF (-40 to 70ºC)
Storage temperature	-40 to 185ºF (-40 to 85°C)
Storage and operating humidity range	5 % to 95 % relative humidity (RH), non-condensing
Resolution	±0.125ºF over a range of 60 to 80ºF (15.56 to 26.67°C) ±0.25 ºF when outside this range
Receiver voltage	24 V nominal ac/dc ± 10%
Receiver power consumption	<2.5VA
Housing Material	Polycarbonate/ABS blend, suitable for plenum mounting, UV protected, UL 94: 5 VA flammability rating
Mounting	Factory mounted on exterior of control box.
Range(i)	Open range - 2,500 ft (762m) w/ packet error rate of 2 % Indoor: Typical range is 200ft (61mm); actual range is dependent on the environment.
Output power	100 mW - North America
Radio frequency	2.4 GHz (IEEE Std 802.15.4-2003 compliant) (2405-2480 MHz, 5 MHz spacing)
Radio channels	16
Address range	00-99
RoHS compliance	Yes
Agency Listing	UL Listed: UL94, 5VA flammability rating and UL916. CSA - C22.2 No. 205-M1983 Signal Equipment

(i) Range values are estimated transmission distances for satisfactory operation of the 100 mW version. Estimated transmission distance for the 10 mW version will be less. Actual distance is job specific and must be determined during site evaluation.

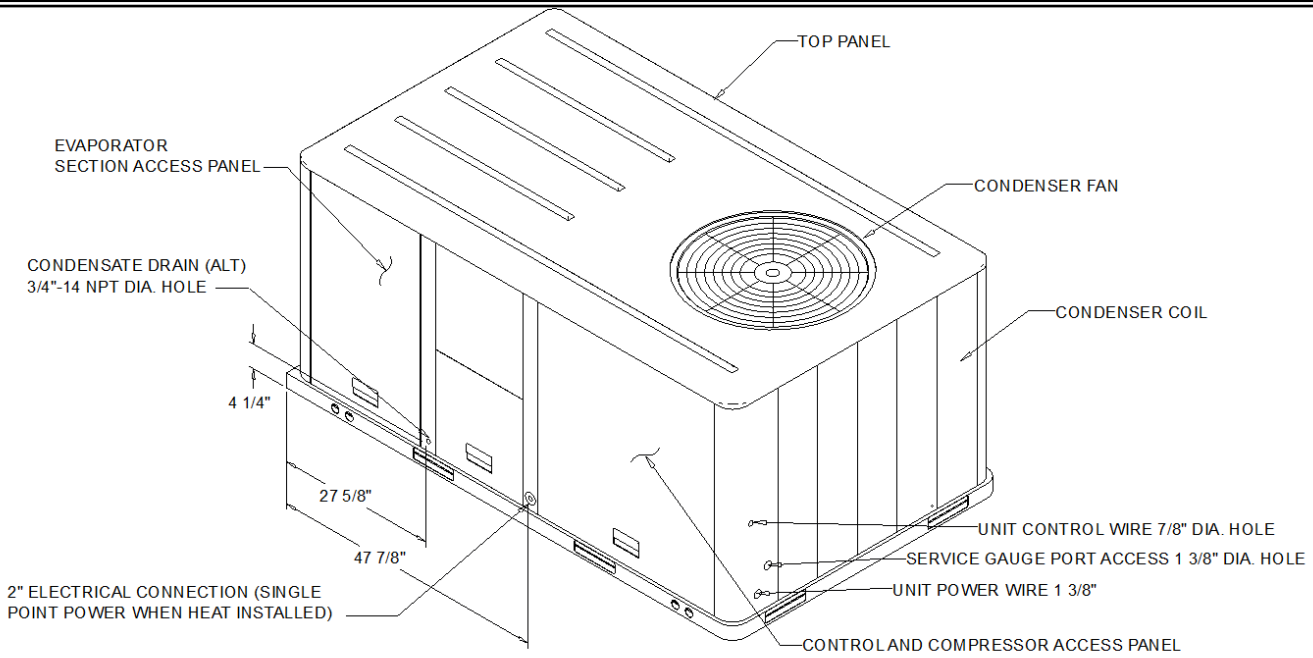
Placement of the receiver and the sensor is critical to proper system operation. In most general office space installations, distance is not the limiting factor for proper radio signal quality. It is more greatly affected by walls, barriers, and general clutter. In general, sheetrock walls and ceiling tiles offer little restriction to the propagation of the radio signal throughout the building as opposed to concrete or metal barriers.

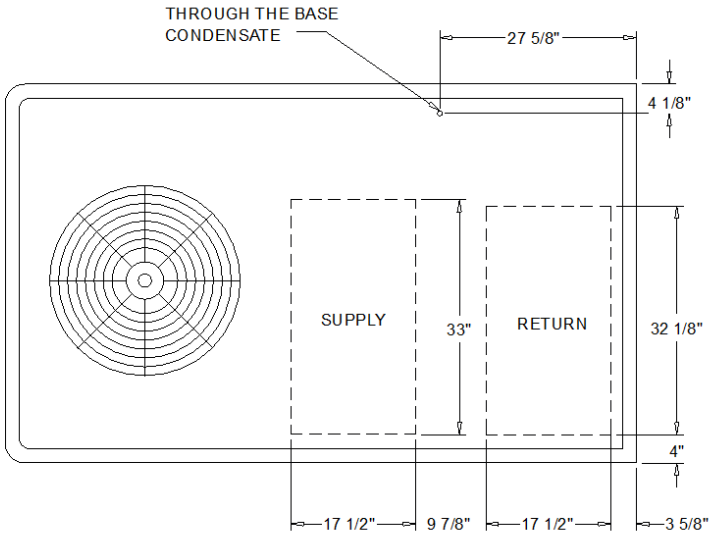

208 Volt, 1 Phase
L2
L1
G
Heater
Controls
Wiring



NOTE:

1. ——— FACTORY WIRING
   ——— FIELD WIRING
   — — — OPTIONAL OR ALTERNATE WIRING
2. BARE WIRE ENDS OR 1/4" QUICK CONNECT TERMINALS REQUIRED FOR ALL FIELD CONNECTIONS.
3. NO ADDITIONAL WIRING REQUIRED FOR NIGHT SETBACK OVERRIDE (ON/CANCEL).
4. IF UNIT MOUNTED TRANFORMER IS NOT PROVIDED, POLARITY FROM UNIT TO UNIT MUST BE MAINTAINED TO PREVENT PERMANENT DAMAGE TO CONTROL BOARD. IF ONE LEG OF 24VAC SUPPLY IS GROUNDED, THEN GROUND LEG MUST BE CONNECTED TO J15.
5. CONTACTORS ARE 24VAC: 10VA MAX/COIL (MAGNETIC CONTACTORS).
6. OPTIONAL FUSE, DISCONNECT SWITCH & TRANSFORMER LOCATED IN CONTROL BOX FOR COOLING & HOT WATER UNITS. LOCATED IN HEATER ON ELECTRIC HEAT UNITS.
   TRANSFORMER WIRE COLORS: 120V-W, 208V-R, 240V-O, 277V-BR, 480V-R/BK, 575V-R, 190V-R, 220V-R, 347-R.
7. SCREW TERMINAL ADAPTERS REQUIRED FOR BI1, UI1, UI2, IMC & LINK.
8. TO USE AI3 WITH A SUPPLY AIR SENSOR FOR AUTO-CHANGEOVER, REASSIGNMENT OF AI3 TO SAT WITH TU IS REQUIRED.
9. ZONE SENSOR IMC TERMINALS REQUIRE SHIELDED TWISTED PAIR WIRING FOR OPTIONAL USE OF COMMUNICATIONS JACK.
10. 24Vdc REQUIRED FOR TRANE SCR ELECTRIC HEAT MODULE.

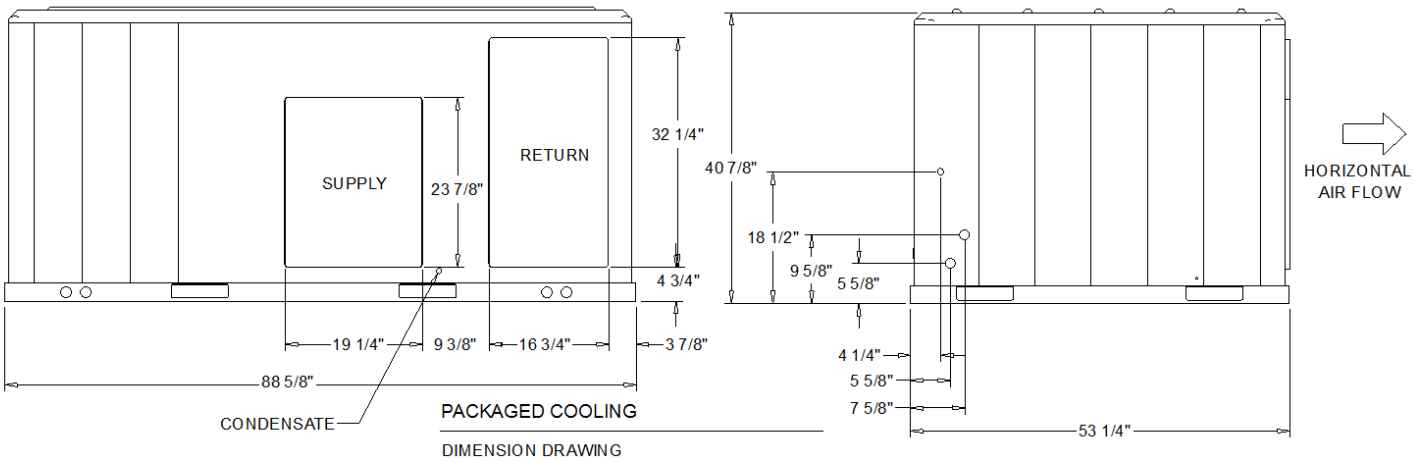




NOTES:
1. THRU -THE -BASE ELECTRICAL IS NOT STANDARD ON ALL UNITS.
2. VERIFY ALL DIMENSIONS WITH INSTALLER DOCUMENTS BEFORE INSTALLATION.

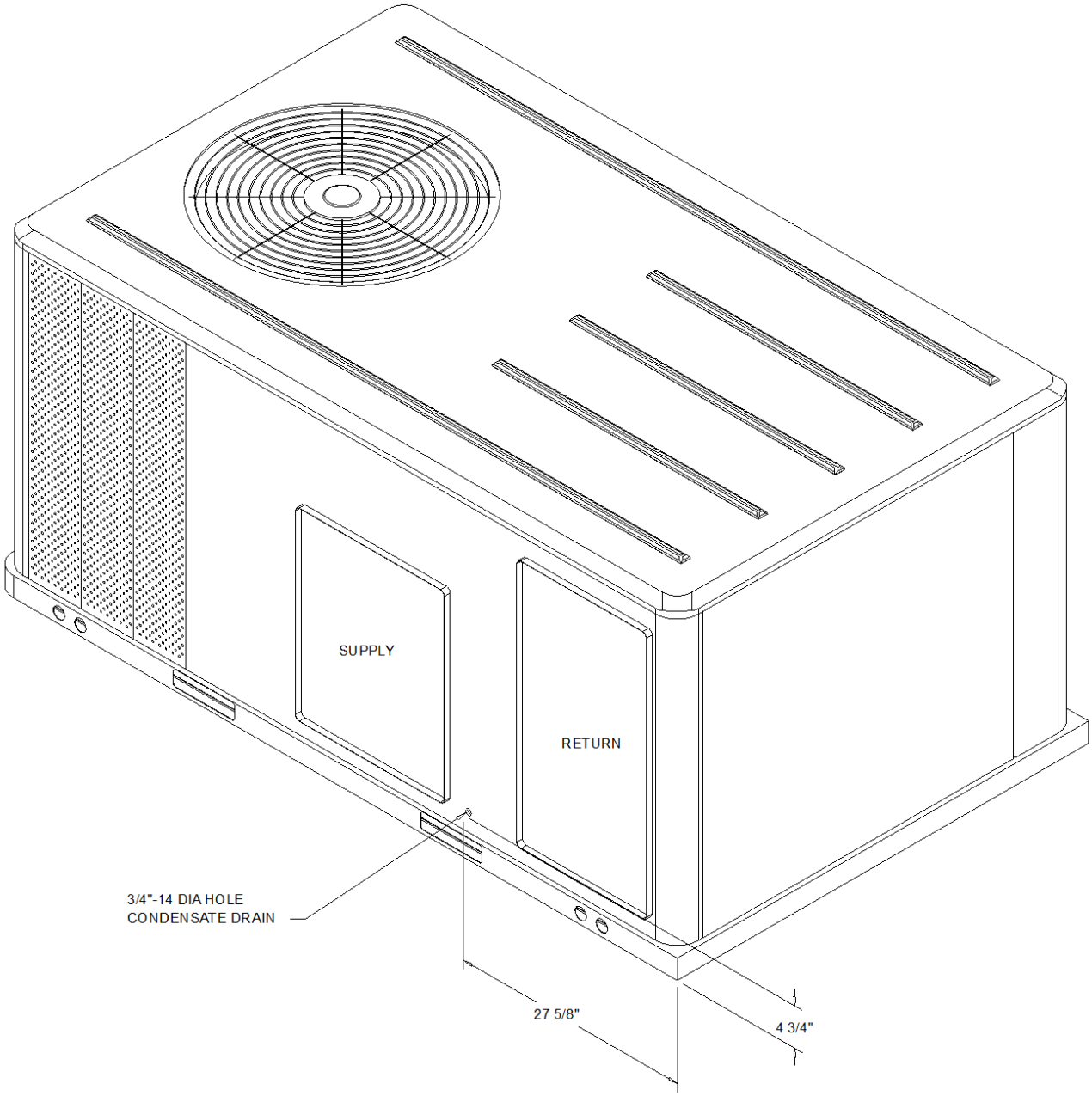
PLAN VIEW UNIT

DIMENSION DRAWING



PACKAGED COOLING

DIMENSION DRAWING



ISOMETRIC-PACKAGED COOLING

ELECTRICAL / GENERAL DATA

GENERAL (2)(4)(6)

Model:	THC067E	Oversized Motor
Unit Operating Voltage:	187-253	MCA:
Unit Primary Voltage:	208	MFS:
Unit Secondary Voltage	230	MCB:
Unit Hertz:	60	
Unit Phase:	3	
SEER	13.0	
	17.2	
Standard Motor		Field Installed Oversized Motor
MCA:	33.0	MCA:
MFS:	45.0	MFS:
MCB:	45.0	MCB:

WITH HEATER

Heater kW Rating :	13.1/17.4		
Stage:	2		
MCA:	59.0/66.0		
MFS	60.0/70.0		
MCB	60.0/70.0		
Oversized Motor		Field Installed Oversized Motor	
MCA:		MCA:	N/A
MFS:		MFS:	N/A
MCB:		MCB:	N/A

INDOOR MOTOR

Standard Motor		Outsized Motor		Field Installed Oversized Motor	
Number:	1	Number:		Number:	N/A
Horsepower:	1.0	Horsepower:		Horsepower:	N/A
Motor Speed (RPM):	--	Motor Speed (RPM):		Motor Speed (RPM):	N/A
Phase:	1	Phase:		Phase:	N/A
Full Load Amps:	9.4	Full Load Amps:		Full Load Amps:	N/A
Locked Rotor Amps:	--	Locked Rotor Amps:		Locked Rotor Amps:	N/A

COMPRESSOR Circuit 1/2

Number:	1
Horsepower:	4.3
Phase:	3
Rated Load Amps:	16.2
Locked Rotor Amps:	--

OUTDOOR MOTOR

Number:	1
Horsepower:	0.40
Motor Speed (RPM):	1075
Phase:	1
Full Load Amps:	2.5
Locked Rotor Amps:	--

POWER EXHAUST ACCESSORY (3,7)

(Field Installed Power Exhaust)

Phase:	N/A
Horsepower:	N/A
Motor Speed (RPM):	N/A
Full Load Amps:	N/A
Locked Rotor Amps:	N/A

FILTERS

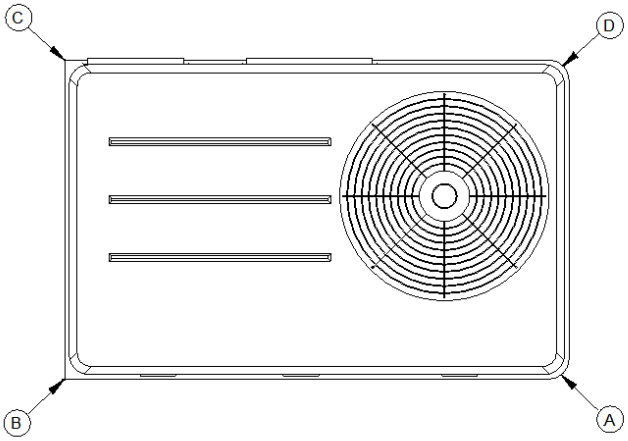
Type:	Throwaway
Furnished:	Yes
Number	4
Recommended	16"x25"x2"

REFRIGERANT (2)

Type	R-410
Factory Charge	
Circuit #1	12.5 lb
Circuit #2	N/A

NOTES:

1. Maximum (HACR) Circuit Breaker sizing is for installations in the United States only.
2. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
3. Value does not include Power Exhaust Accessory.
4. Value includes oversized motor.
5. Value does not include Power Exhaust Accessory.
6. EER is rated at AHRI conditions and in accordance with DOE test procedures.
7. Installation of this power exhaust kit will affect unit level MCA and could affect MOP sizing having a direct impact on existing field wiring and unit protection devices. The change in MCA/MOP is the sole responsibility of the field installing party. Trane will not issue new nameplates as a result of this power exhaust accessory installation. FLA of the power exhaust kit option must be added to the MCA of the unit for building supply conductor sizing determination.



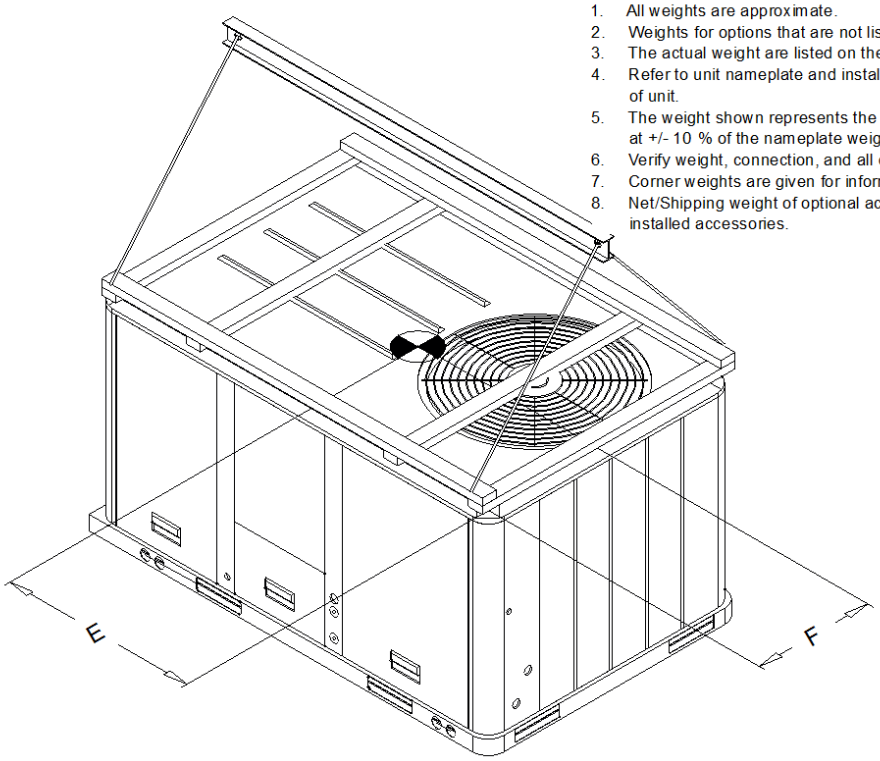
CORNER WEIGHT

INSTALLED ACCESSORIES NET WEIGHT DATA

ACCESSORY	WEIGHTS
ECONOMIZER	36.0 lb
MOTORIZED OUTSIDE AIR DAMPER	
MANUAL OUTSIDE AIR DAMPER	
BAROMETRIC RELIEF	
OVERSIZED MOTOR	
BELT DRIVE MOTOR	
POWER EXHAUST	
HEATER	30.0 lb
REHEAT	15.0 lb
THROUGHT THE BASE ELECTRICAL (FIOPS)	
UNIT MOUNTED CIRCUIT BREAKER (FIOPS)	
UNIT MOUNTED DISCONNECT (FIOPS)	
POWERED CONVENIENCE OUTLET (FIOPS)	
HINGED DOORS (FIOPS)	12.0 lb
HAIL GUARD	20.0 lb
SMOKE DETECTOR, SUPPLY / RETURN	
NOVAR CONTROL	
ROOF CURB	

BASIC UNIT WEIGHTS		CORNER WEIGHTS				CENTER OF GRAVITIY	
SHIPPING	NET	A	241.0 lb	C	139.0 lb	(E) LENGHT	(F) WIDTH
841.0 lb	746.0 lb	B	193.0 lb	D	173.0 lb	39"	22"

NOTE:
1. All weights are approximate.
2. Weights for options that are not list refer to Installation guide.
3. The actual weight are listed on the unit nameplate.
4. Refer to unit nameplate and installation guide for weights before scheduling transportation and installation of unit.
5. The weight shown represents the typical unit operating weight for the configuration selected. Estimated at +/- 10 % of the nameplate weight. .
6. Verify weight, connection, and all dimension with installer documents before installation.
7. Corner weights are given for information only.
8. Net/Shipping weight of optional accessories should be added to unit weight when ordering factory or field installed accessories.

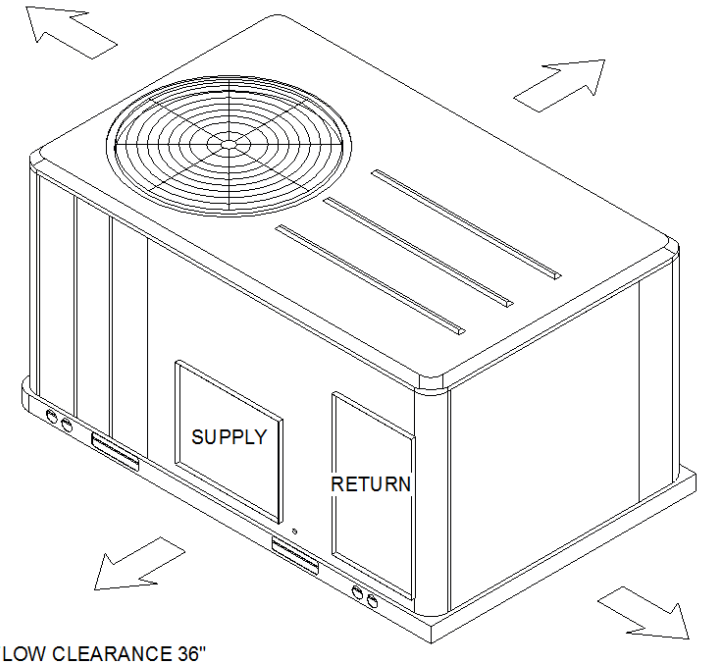


RIGGING AND CENTER OF GRAVITY

CLEARANCE FROM TOP OF UNIT 72"

CLEARANCE 36"

CLEARANCE 48"



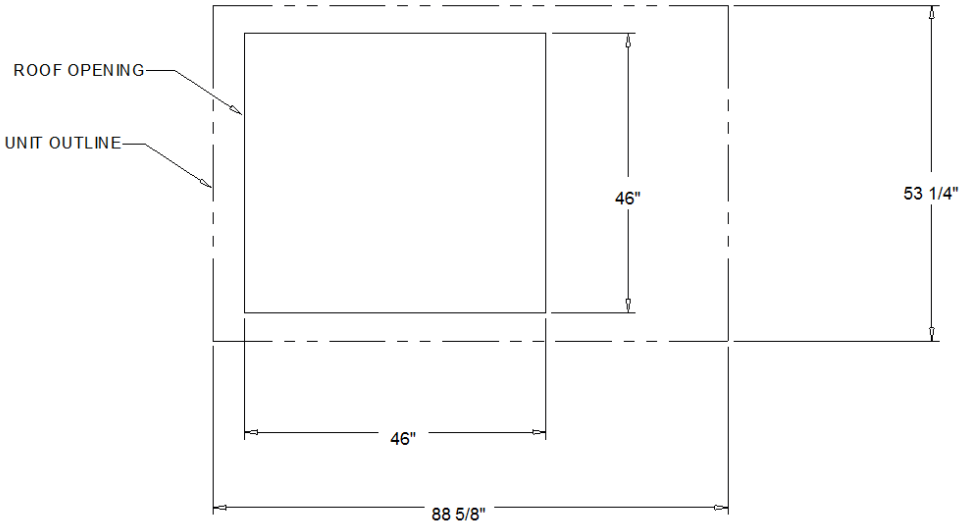
DOWNFLOW CLEARANCE 36"

HORIZONTAL CLEARANCE 18"

CLEARANCE 36"

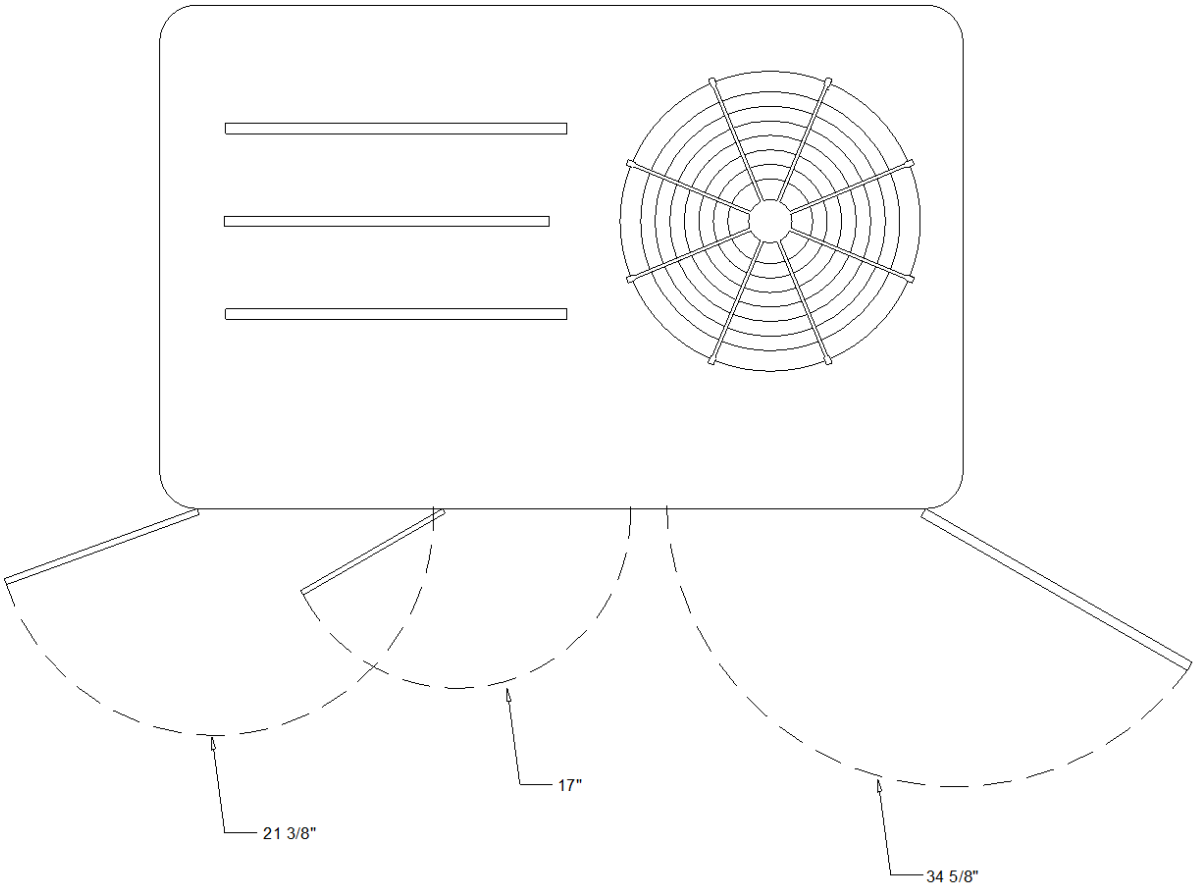
PACKAGED COOLING

CLEARANCE

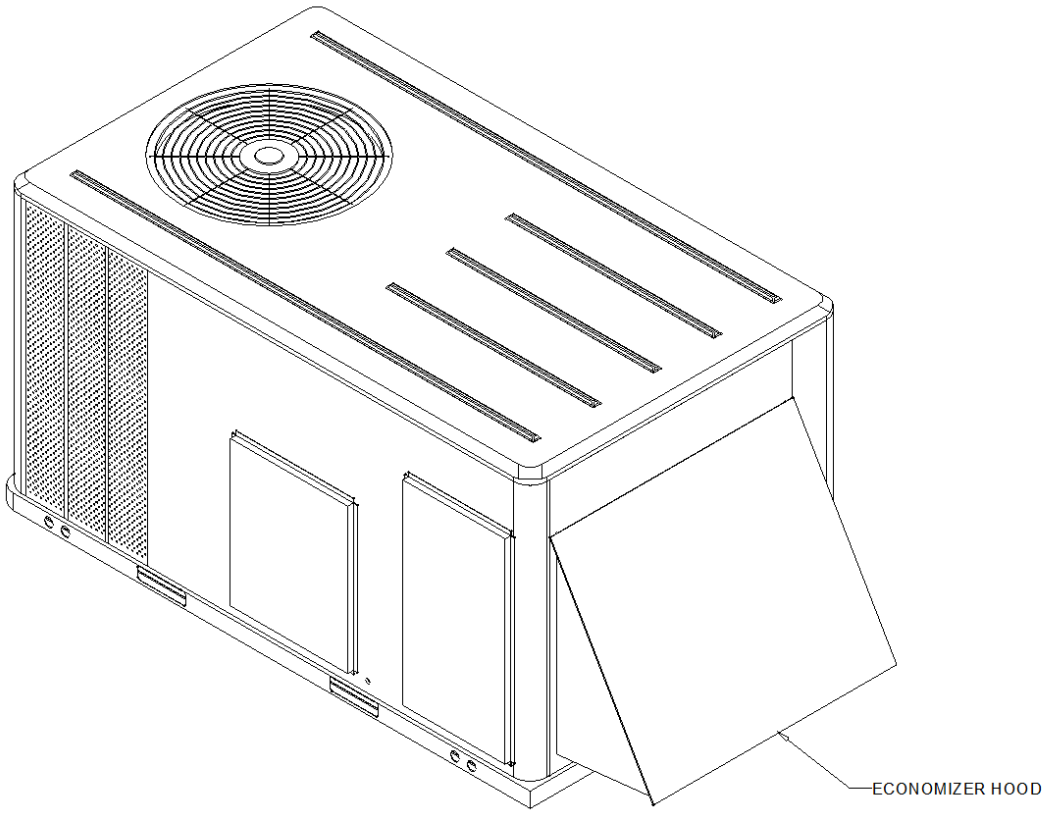


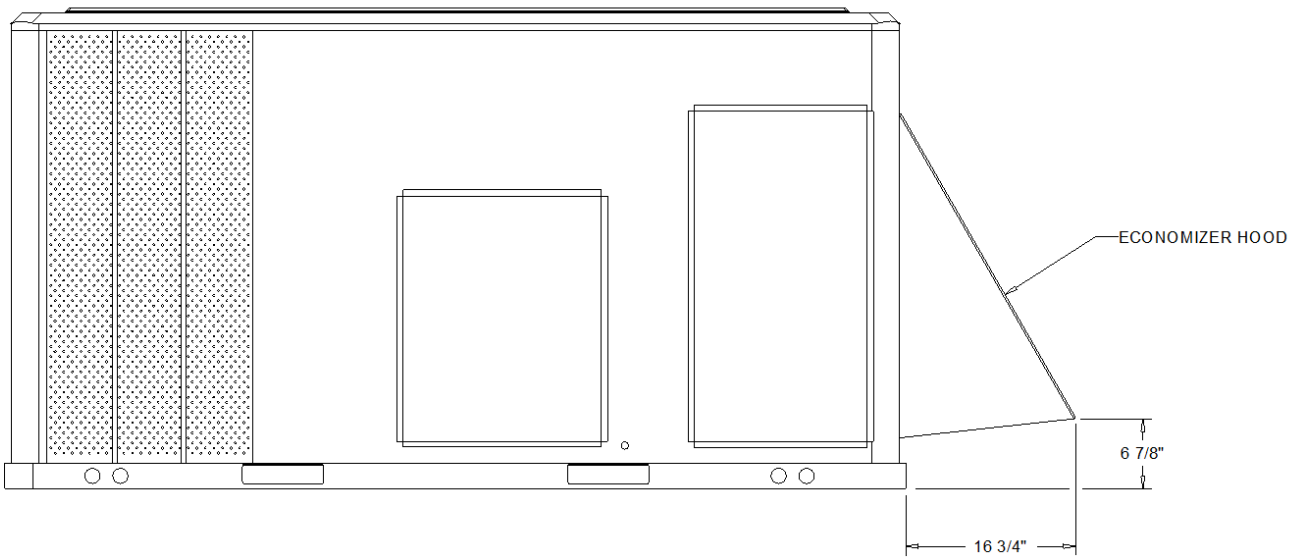
PACKAGED COOLING

DOWNFLOW TYPICAL ROOF OPENING



SWING DIAMETER - HINGED DOOR(S) OPTION





ECONOMIZER HOOD

ACCESSORY

Technical Specifications

Exhibit 4
Basis of Design Narrative

Mechanical and Electrical
Schematic Design Narrative

Fire Station 54

Ft. Lauderdale, FL

January 10, 2022

Prepared by:
CES Engineering Services, LLC.
2937 W. Cypress Creek Rd, Suite 102
Fort Lauderdale, FL 33309
CES PN 2021673.00

OVERVIEW:

CES was retained to design a new mechanical system for Fire Station 54, a two story, 9,382 square foot building belonging to the City of Fort Lauderdale, designed to house up to 7 crew members on a regular basis, and to allow for use of the multi-purpose room for up to 25 occupants.

In addition to the living and working spaces, the building houses an Apparatus Bay for two (2) emergency vehicles.

All Mechanical and Electrical system installations shall be in accordance with the current Building Code of the State of Florida.

Existing Conditions:

There have been numerous studies and assessments performed for the existing facility that indicate a combination of design, installation, and operational issues that combined to produce poor indoor air conditions.

It is CES's goal to complete the design of the system entirely independent of any design work completed thus far; however, CES will utilize the existing equipment to the extent possible to minimize the construction costs.

New Design:

CES performed cooling and heating load calculations for the minimum and maximum occupant counts, ventilation rate calculations for the expected occupants in the building, ventilation rate calculations for the apparatus bay to achieve 10 Air Changes Per Hour (ACH) while the vehicles are operating, and an air balance calculation for the building. Please refer to Appendix A for all calculations.

Mechanical Load Calculation Summary:

		Sensible MBH	Total MBH	Tonnage
First Floor	Normal Operation	43.3	70.9	5.9 TON
Second floor	Normal Operation	49.8	97.2	8.1 TON
First Floor	Community Ops	21.1	48.2	4 TON

Design Approach:

The design approach for the living/work space is to retain a Variable Air Volume system for load variations and individualized bunk room control, with a central Dedicated Outside Air System (DOAS)

for ventilation air, building pressurization, and to isolate "hot" rooms on the first floor from both the Apparatus Bay and the main building. Equipment will remain DX package and split systems to retain the reuse of some existing equipment and roof penetrations.

The apparatus bay (App Bay) is designed, as requested by the owner, for general ventilation only, with neither a direct exhaust capture system nor a scrubber system. The Owner has been advised that CES recommends one of these two approaches as best management practices for controlling exhaust contaminants; however, the Owner declined to utilize either of these systems due to concerns regarding user error and maintenance requirements.

Equipment Reuse:

The following summarizes the equipment that will be removed and the equipment that will be reused for the new design:

1. All primary cooling equipment will be removed, inclusive of AHU/CU-1, RTU-1 and RTU-2. CES explored the option of converting the constant volume RTU to a variable volume RTU to enable reuse of one RTU; however, this was not cost effective.
2. The existing roof penetrations will be reused.
3. Approximately 40% of VAV units will be retained, and the remainder will be removed.
4. All ductwork will be removed and replaced; the existing ductwork is oversized and will not provide proper airflow.
5. Approximately 40% of exhaust fans will be retained, and the remainder will be removed.
6. The App Bay exhaust fans and intake vents will be retained.
7. The existing Trane control system will be retained for the building HVAC systems.
8. The App Bay will be disconnected from the Trane system and will be connected to a new Honeywell control system inclusive of CO, NO2 and occupancy sensors.

Scope of Work Summary:

The scope of work for each section of the building is summarized below. Refer to the Schematic Design Plans for additional information.

First Floor Scope of Work:

1. Provide new dual circuit, 6 ton DX VAV Split System for the first floor.
2. Proovide a supplemental 3 ton ductless split DX system with cassette (CU/AHU-5) to serve the multipurpose room during community events and other occasions of surge capacity.
3. Decouple the Decon room, Medical Storage, Ice Storage, and Bunker Storage rooms from the system serving first floor. Supply for these rooms to be provided by the new DOAS system and all rooms shall be direct exhausted.
4. All main ductwork shall be removed for replacement. New ductwork will be appropriately sized for the smaller equipment.
5. Provide roof-mounted DOAS unit and supply all rooms as noted in Item #2. Note that a new shaft will be required to bring conditioned ventilation air from the roof-mounted DOAS to the first floor. Refer to the Schematic Design Plans for proposed shaft locations.

6. DOAS will supply conditioned ventilation air to the return side of the new air handling unit with a motorized damper for demand control ventilation. This will prevent over-cooling of the return air which would result in poor humidity control.
7. Remove most VAV boxes.
8. Re-use two VAV box and relocated them to serve the Gym and Offices areas.
9. All exhaust fans will be retained with the exception of the electric room fan.
10. Provide new air curtain at the entrance to the medical storage room.
11. Electric room exhaust fan will be removed in its entirety and the associated outside air louver will be removed.
12. New UVC germicidal lights will be provided both in-duct and washing the cooling coil.

Second Floor

1. Provide new dual circuit, 7.5 ton VAV RTU to serve the entire second floor.
2. Decouple the fire pole room from the system serving the second floor. Supply for this room to be provided by the new DOAS system with a small exhaust fan to maintain negative pressure and exhaust light gases.
3. All main ductwork will be removed for replacement. New ductwork will be appropriately sized for the smaller equipment.
4. Bunk room VAV boxes will be re-used.
5. Remove the bathroom fans for replacement with larger fans.
6. Remove the kitchen supply fan in its entirety. Make-up air to be provided by the DOAS unit.
7. Remove the electric room exhaust fan and provide cooling air supply.
8. Remove the dryer room general exhaust fan.
9. The roof-mounted DOAS unit will supply the fire pole room, provide make-up air for the kitchen exhaust fan, and will supply preconditioned ventilation air to the return side of the RTU.
10. New UVC germicidal lights will be provided both in-duct and washing the cooling coil.

Apparatus Bay:

1. Existing roof mounted fans will be adjusted to new CFM values to achieve 10 ACH. The fans will increase from 1,320CFM to 1,765CFM. Owner to provide approved fan submittals for confirmation that the installed fans can increase to the CFM required.
2. Two existing roof mounted air intakes will remain.
3. Provide new NOx/CO gas detection system inclusive of controls, sensors, alarms and strobes.
4. Exhaust fans will be controlled via occupancy sensor, with emergency override by the gas detection system.

Controls:

1. The existing Trane control system will be retained.
2. The App Bay will be decoupled from the building control system.

3. Humidity and CO2 sensors will be installed in all bunk rooms and throughout the first floor.
4. Primary control will be by temperature; however, dehumidification sequences will be added to the control system to ensure that humidity remains within the 50%-60% target range.
5. CO2 sensors will be utilized for demand control ventilation. This will control the dampers providing ventilation air from the DOAS to the main cooling systems. The DOAS will be variable speed and will ramp up and down to maintained duct pressure.
6. The second floor will be assumed occupied at all times; the first floor will set back to unoccupied setpoints after 6pm with push button timed overrides in all spaces.
7. The bunk rooms will be provided with a 7°F temperature range, adjustable by the occupant, from 68-75°F. The system will allow the VAV boxes to reheat to achieve setpoints.
8. The kitchen exhaust fan will be interlocked to a new make-up air damper that will enable a flow of conditioned outside air when the fan is enabled.
9. The App Bay fans will enable when the occupancy sensor is triggered, and will remain active for 12 minutes once vacant.
10. App Bay fans will enable upon a gas alarm of 25 PPM CO or 2 PPM No2. A high gas alarm will trigger an audible alarm and visual lights.
11. The supplemental DX unit provided for the community/multi-purpose room will be set to 2°F warmer than the room thermostat. This will ensure that the supplemental cooling unit does not run unless the space is occupied and additional cooling is required.

Electrical:

The overall electrical load will be reduced with the new mechanical design. Overall HVAC tonnage will be reduced by more than half, and the total quantity of equipment largely remains the same.

The intent is to reuse the existing circuits, replacing overcurrent protection devices as needed for smaller units.

Appendix A: Calculations

System Checksums

By CES

AHU-1(First Floor)

Variable Volume Reheat (30% Min Flow Default)

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 15
Outside Air: OADB/WB/HR: 91 / 78 / 125

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	4,042	0	4,042	6
Glass/Door Cond	5,005	0	5,005	7
Wall Cond	2,216	1,084	3,300	5
Partition/Door	0		0	0
Floor	0		0	0
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	11,264	1,084	12,348	17
Internal Loads				
Lights	10,198	0	10,198	14
People	9,120	0	9,120	13
Misc	4,500	0	4,500	6
Sub Total ==>	23,818	0	23,818	34
Ceiling Load	541	-541	0	0
Ventilation Load	0	0	34,386	49
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	459		459	1
Exhaust Heat		-162	-162	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	36,082	381	70,849	100.00

CLG SPACE PEAK

Mo/Hr: 11 / 15
OADB: 83

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	9,834	28
Glass/Door Cond	3,042	9
Wall Cond	1,536	4
Partition/Door	0	0
Floor	0.00	0
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	14,412	42
Internal Loads		
Lights	10,198	30
People	4,560	13
Misc	4,500	13
Sub Total ==>	19,258	56
Ceiling Load	376	1
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
Underflr Sup Ht Pkup		
Supply Air Leakage		
Grand Total ==>	34,509	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 47

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	0	0.00
Glass Solar	0	0	0.00
Glass/Door Cond	-4,494	-4,494	23.37
Wall Cond	-1,653	-2,453	12.76
Partition/Door	0	0	0.00
Floor	0	0	0.00
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-6,146	-6,947	36.13
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-578	0	0.00
Ventilation Load	0	-6,642	34.55
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		108	-0.56
OA Preheat Diff.		-290	1.51
RA Preheat Diff.		-2,734	14.22
Additional Reheat		-2,722	14.16
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-6,724	-19,226	100.00

TEMPERATURES

	Cooling	Heating
SADB	48.6	79.1
Ra Plenum	68.4	67.6
Return	68.4	67.6
Ret/OA	75.3	56.8
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	1,596	541
Terminal	1,596	541
Main Fan	1,596	541
Sec Fan	0	0
Nom Vent	445	284
AHU Vent	445	284
Infil	0	0
MinStop/Rh	541	541
Return	1,466	502
Exhaust	315	245
Rm Exh	130	39
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	27.9	52.4
cfm/ft²	0.35	0.12
cfm/ton	270.31	
ft²/ton	778.61	
Btu/hr·ft²	15.41	-4.18
No. People	12	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	5.9	70.9	43.3	1,458	75.3	64.5	73.4	48.6	47.4	46.8
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.9	70.9								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	4,597		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	1,698	231	14
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-18.4	541	48.6	79.1
Aux Htg	0.0	0	0.0	0.0
Preheat	-0.8	445	47.0	48.6
Reheat	-11.7	541	48.6	68.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-19.2			

Project Name:
Dataset Name: 2021673 NORMAL.TRC

TRACE® 700 v6.3.5 calculated at 03:42 PM on 01/06/2022
Alternative - 1 System Checksums Report Page 1 of 2

System Checksums

By CES

RTU-1(Second Floor)

Variable Volume Reheat (30% Min Flow Default)

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 15
Outside Air: OADB/WB/HR: 91 / 78 / 125

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	9,683	9,683	10
Glass Solar	3,789	0	3,789	4
Glass/Door Cond	4,362	0	4,362	4
Wall Cond	2,112	802	2,914	3
Partition/Door	0		0	0
Floor	0		0	0
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	10,263	10,485	20,747	21
Internal Loads				
Lights	6,143	0	6,143	6
People	5,500	0	5,500	6
Misc	1,600	0	1,600	2
Sub Total ==>	13,243	0	13,243	14
Ceiling Load	5,730	-5,730	0	0
Ventilation Load	0	0	66,848	69
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	997		997	1
Exhaust Heat		-4,676	-4,676	-5
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	30,232	79	97,159	100.00

CLG SPACE PEAK

Mo/Hr: 9 / 16
OADB: 89

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	4,828	17
Glass/Door Cond	4,041	14
Wall Cond	2,239	8
Partition/Door	0	0
Floor	0.00	0
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	11,107	39
Internal Loads		
Lights	6,143	22
People	2,750	10
Misc	1,600	6
Sub Total ==>	10,493	37
Ceiling Load	5,609	20
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
Grand Total ==>	28,215	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 47

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	-2,510	12.76
Glass Solar	0	0	0.00
Glass/Door Cond	-3,923	-3,923	19.95
Wall Cond	-1,536	-2,193	11.15
Partition/Door	0	0	0.00
Floor	0	0	0.00
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-5,459	-8,626	43.87
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-2,264	0	0.00
Ventilation Load	0	-9,526	48.45
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		623	-3.17
OA Preheat Diff.		-181	0.92
RA Preheat Diff.		-1,569	7.98
Additional Reheat		-385	1.96
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-7,723	-19,664	100.00

TEMPERATURES

	Cooling	Heating
SADB	47.4	81.7
Ra Plenum	74.6	65.4
Return	74.6	65.4
Ret/OA	86.5	50.6
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	1,226	504
Terminal	1,226	504
Main Fan	1,226	504
Sec Fan	0	0
Nom Vent	865	407
AHU Vent	865	407
Infil	0	0
MinStop/Rh	504	504
Return	681	312
Exhaust	320	215
Rm Exh	545	192
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	70.6	80.7
cfm/ft²	0.44	0.18
cfm/ton	151.37	
ft²/ton	340.27	
Btu/hr·ft²	35.27	-7.14
No. People	11	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB/WB/HR °F	Enter DB/WB/HR °F	Enter DB/WB/HR gr/lb	Leave DB/WB/HR °F	Leave DB/WB/HR °F	Leave DB/WB/HR gr/lb
Main Clg	8.1	97.2	49.8	1,194	86.5	73.6	104.3	47.4	47.3	48.2
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	8.1	97.2								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	2,755		
Part	0		
Int Door	1		
ExFlr	0		
Roof	2,727	0	0
Wall	1,560	201	13
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-19.3	504	47.4	81.7
Aux Htg	0.0	0	0.0	0.0
Preheat	-0.3	865	47.0	47.4
Reheat	-11.6	504	47.4	68.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-19.7			

Room Checksums

By CES

AHU-5(3 TON SUPPLEMENTAL FOR MULTI-PURPOSE ROOM ONLY)

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 8 / 15
Outside Air: OADB/WB/HR: 91 / 78 / 125

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	0	0	0	0
Glass Solar	1,384	0	1,384	3
Glass/Door Cond	1,670	0	1,670	3
Wall Cond	591	320	911	2
Partition/Door	0		0	0
Floor	0		0	0
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	3,645	320	3,965	8
Internal Loads				
Lights	814	0	814	2
People	12,500	0	12,500	26
Misc	0	0	0	0
Sub Total ==>	13,314	0	13,314	28
Ceiling Load	45	-45	0	0
Ventilation Load	0	0	31,210	65
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		-308	-308	-1
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	17,004	-33	48,181	100.00

CLG SPACE PEAK

Mo/Hr: 11 / 15
OADB: 83

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	0	0
Glass Solar	4,392	29
Glass/Door Cond	1,014	7
Wall Cond	485	3
Partition/Door	0	0
Floor	0.00	0
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	5,891	40
Internal Loads		
Lights	814	5
People	6,250	42
Misc	0	0
Sub Total ==>	7,064	47
Ceiling Load	31	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	1,910	13
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
System Plenum Heat		
Underflr Sup Ht Pkup		
Supply Air Leakage		
Grand Total ==>	14,896	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 47

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	0	0	0.00
Glass Solar	0	0	0.00
Glass/Door Cond	-1,501	-1,501	25.74
Wall Cond	-351	-540	9.25
Partition/Door	0	0	0.00
Floor	0	0	0.00
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-1,852	-2,041	34.99
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	-47	0	0.00
Ventilation Load	0	-3,934	67.45
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		75	-1.29
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		67	-1.15
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-1,899	-5,833	100.00

TEMPERATURES

	Cooling	Heating
SADB	44.2	78.1
Ra Plenum	68.4	67.6
Return	68.4	67.6
Ret/OA	91.0	47.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	560	168
Terminal	560	168
Main Fan	560	168
Sec Fan	0	0
Nom Vent	560	168
AHU Vent	560	168
Infil	0	0
MinStop/Rh	168	168
Return	560	168
Exhaust	560	168
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	100.0	100.0
cfm/ft²	1.53	0.46
cfm/ton	139.47	
ft²/ton	91.41	
Btu/hr·ft²	131.28	-17.35
No. People	25.0	68.1/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	4.0	48.2	21.1	404	91.0	78.0	124.6	44.2	40.2	30.6
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	4.0	48.2								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	367		
Part	0		
Int Door	1		
ExFlr	0		
Roof	0	0	0
Wall	400	77	19
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-6.4	168	44.2	78.1
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Reheat	-4.5	168	44.2	68.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-6.4			

VENTILATION RATES TABLE PER 2020 FLORIDA BUILDING CODE - MECHANICAL 7TH EDITION

Room		Occupancy	Outside Air							Exhaust Air	
			Area Component		People Component		Total				
Name	Area (sq.ft.)	Classification	CFM per sq.ft.	Required CFM	CFM per Person	Required CFM	Required CFM	Override CFM	CFM	Override CFM	CFM
WATCH OFFICE	81	Office spaces	0.06	5	5.0	5	10		10		
LOBBY	246	Main entry lobbies	0.06	15	5.0	0	15		15		
MULTI-PURPOSE ROOM	367	Multipurpose assembly	0.06	22	5.0	20	45		45		
TELECOM ROOM	140	Office spaces	0.06	8	5.0	5	15		15		
CORRIDOR 1 / WORK AREA	568	Corridors	0.06	34			35		35		
WOMEN	41	Bathrooms/toilet - private						25	25	50	50
MEN	39	Bathrooms/toilet - private						25	25	50	50
GYMNASIUM	460	Health club/weight room	0.06	28	20.0	80	110		110		
BUNKER STORAGE	221	Storage rooms	0.12	27			~~30~~	100	100	30	30
STORAGE	48	Storage rooms	0.12	6			10		10		
MECHANICAL	103										
STORAGE	47	Storage rooms	0.12	6			10		10	10	10
STORAGE/ICE	47	Storage rooms	0.12	6			~~10~~	75	75	10	10
MEDICAL STORAGE	91	Storage rooms	0.12	11			~~15~~	75	75	15	15
DECON ROOM	82	Storage rooms	0.12	10			~~10~~	75	75	10	10
OFFICE 2	140	Office spaces	0.06	8	5	5	15		15		
OFFICE 1	140	Office spaces	0.06	8	5	5	15		15		
ELECTRICAL ROOM	130										
FIRST FLOOR TOTAL	2,990								655		175
BUNK 1	116	Bedroom/living room	0.06	7	5	5	~~15~~	25	25		
BUNK 2	117	Bedroom/living room	0.06	7	5	5	~~15~~	25	25		
BUNK 3	117	Bedroom/living room	0.06	7	5	5	~~15~~	25	25		
BUNK 4	116	Bedroom/living room	0.06	7	5	5	~~15~~	25	25		
CORRIDOR 1	180	Corridors	0.06	11			~~15~~	25	25		
STORAGE	28	Storage rooms	0.12	3			5		5		
CORRIDOR 4	186	Corridors	0.06	11			15		15		
FIRE POLE	69	Storage rooms	0.12	8			~~10~~	50	50	80	80
JANITOR	42	Storage rooms	0.12	5			10		10	50	50
BATH 2	60	Bathrooms/toilet - private						50	50	80	80
BATH 3	54	Bathrooms/toilet - private						50	50	80	80
BUNK 5	116	Bedroom/living room	0.06	7	5	5	~~15~~	25	25		
CORRIDOR 3	146	Corridors	0.06	9			~~10~~	50	50		
DAY ROOM	272	Bedroom/living room	0.06	16	5	5	~~25~~	25	25		
BATH 4	53	Bathrooms/toilet - private						50	50	80	80
BUNK 6	116	Bedroom/living room	0.06	7	5	5	~~15~~	25	25		
BATH 5	53	Bathrooms/toilet - private						50	50	80	80
BATH 1 ACCESSIBLE	58	Bathrooms/toilet - private						25	25	80	80
LAUNDRY	71	Office spaces	0.06	4	5	5	~~10~~	100	100	190	190
SUPPLY ROOM	94	Storage rooms	0.12	11			15		15		
ELEC CL.	35										
BUNK 7	116	Bedroom/living room	0.06	7	5	10	~~20~~	25	25		
STORAGE	28	Storage rooms	0.12	3			5		5		
CORRIDOR 2	278	Corridors	0.06	17			20		20		
RECYCLING ROOM	52	Storage rooms	0.12	6			10		10	50	50
DINING ROOM	182	Dining rooms	0.18	33	8	15	50		50	80	80
KITCHEN	272	Kitchens (cooking)						1,200	1,200	1,200	1,200
SECOND FLOOR TOTAL	3,023								1,980		2,050

Technical Specifications

Exhibit 5 Commissioning Process Plan

REVISION HISTORY

Date	Revision	Revision Description
3/22/22		Original

Table 1-Revision History

PLAN CONSIDERATIONS

Whiskey Lima Corp (WLC) is a freelance field engineering firm specializing in investigations, reporting, and resolution of existing building issues, to include heating ventilation and air conditioning (HVAC) performance; humidity control; building pressurization; indoor environmental quality (IEQ); COVID risk mitigation policies and measures; and energy conservation analysis and implementation.

In preparing this Commissioning (Cx) Plan, WLC has exercised best practice and referenced national standards from ASHRAE, NFPA, NEC and local codes. Documentation and data provided by the Owner, designated representatives of the Owner, interested third parties of the Owner, or from the public domain, have been used and referred to in the preparation of this Cx Plan with the understanding that WLC assumes no responsibility or liability for their accuracy. Factual information regarding operations, conditions, and test data provided by the Owner or its representatives has been assumed to be correct and complete. Budget and other limitations on the scope of work may result in missed issues that were not observed and therefore not addressed in this Cx Plan.

This Cx Plan is for the exclusive use of the Owner and other parties authorized by the Owner and WLC. Information contained herein should not be used for purchase or sale transactions of the buildings, HVAC equipment or any other subject matter.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

PURPOSE

This Commissioning Process Plan (Cx Plan) has the purpose of insuring that the HVAC Retrofit for Fire Station 54 is installed, tested, operated and maintained to achieve the Current Facility Requirements developed by the City of Fort Lauderdale ("Owner"). Contractors shall adhere to the requirements of this plan in combination with other project documents, as listed in Appendix A. These are working documents which will evolve as the project progresses.

PROJECT INFORMATION SUMMARY

Fire Station 54 is a two story, 10,064 square foot building completed in 2018. It was designed to house a permanent fire fighter staff of 2 units consisting of up to 7 personnel operating 24 hours a day, 7 days a week. The original HVAC system design, dated 2013, used typical indoor design conditions of 72°F and 50% relative humidity (RH), and specified a dedicated outdoor air system (DOAS) in series with one packaged rooftop unit (RTU) and one split AC system. VAV units were to serve the bunk rooms and other spaces. Exhaust included kitchen, bathroom and apparatus bay exhaust systems. Thermostat controls were wall mounted and wireless. The design was altered in 2017 with deletion of the DOAS, replaced with a second RTU without humidity control or reheat capabilities.

Issues being resolved with this HVAC Retrofit

Shortly after occupancy, the Fire Station experienced issues with high humidity, indoor condensation, negative pressurization and microbial growth. The primary causes of the comfort issues were identified as poor HVAC design, to include the lack of a dedicated outdoor air system (DOAS) to provide adequate dehumidification and excessive cooling capacity overall. Secondary issues included poor controls and exceedingly low and manually controlled temperature setpoints. Numerous investigations, remediation and HVAC equipment retrofits were attempted without resolution of the issues and the station was finally abandoned for safety reasons in 2021.

HVAC Retrofit Design

CES Engineering was engaged to redesign the fire station to permanently resolve its issues. It performed detailed load and other analysis. The Basis of Design was to include a 15 ton DOAS, two RTUs, VAVs, and other equipment. Overall cooling capacity was significantly reduced. Consequently, the entire ductwork system was to be replaced.

Installation Concept

The HVAC retrofit will require the following task sequence:

- Removal, disposal and re-installation of the existing ceiling grid and ductwork.

- Slab penetrations and new duct risers for the DOAS.
- New electrical for VAV and other systems.
- Structural analysis for the DOAS and possible design, materials, fabrication and installation of rooftop curb and support system. Allowances are provided for that purpose.
- Rooftop and ground installation of new HVAC systems, to include DOAS, RTU, split, mini-split, and VAV.
- New controls and fire system integration.
- Commissioning- Conduct of Functional Performance Tests (FPT) to verify all sequences of operation, interlocks, safeties and system integration of commissionable HVAC equipment and controls.

ROLES AND RESPONSIBILITIES

Mechanical Contractor

1. Adhere to City of Fort Lauderdale General Conditions and WLC Commissioning Plan and Specifications, provided in attached Appendices.
2. Provide documentation to support commissioning of this project, to include:
    a. Submittals, other than those provided in the Project Documents for basis of design HVAC equipment and controls.
    b. Shop drawings
    c. HVAC equipment start up reports, per manufacturer Installation Manual for commissionable equipment.
    d. Test and Balance Report
    e. Start UP checklists, per manufacturer and/or provided by WLC.
3. Provide personnel to operate HVAC equipment and controls during Functional Performance Testing.
4. Provide equipment Installation and O&M manuals in digital format (PDF) for development of the building's System Manual
5. Provide As Built drawings in collaboration with CES engineering

Whiskey Lima Corp.

1. As Owner's Representative (OR), coordinate with the Mechanical Contractor in all aspects of the project.
2. As Commissioning Provider (Cx), provide the following to the Mechanical Contractor:
    a. Commissioning Plan
    b. Commissioning Specifications

CES Engineering

1. As Engineer of Record, provide Contract Administration services to include:
    a. Site Walk Through inspection and presentation to Contrcators

b. Responses to Requests for Interpretation (RFI) from contractors.
c. As built drawings at project conclusion

COMMISSIONING SCOPE OF WORK

Equipment to be Commissioned

1. DOAS
2. RTU2
3. Split System 1 (AHU1 & CU1)
4. Split System 2 (AHU2 & CU2)
5. VAVs
6. Controls and Sequences of Operations

Tasks to be Performed by Mechanical Contractor

1. Submittal of manufacturer checklists (from O&M manuals)
2. Submittal of start up checklists
3. Operation of equipment and controls during functional testing
4. Resolution of Issues identified during Functional Performance Testing
5. Submittal of IOM and other documents to prepare Systems Manual
6. Provide certified person to perform building staff Systems and Maintenance Training

GENERAL SCHEDULE

To be provided by WLC as an update to this plan

APPLICABLE CODES AND STANDARDS

- Florida Building Code 5th Edition
- Florida Fire Prevention Code 5th Edition
- National Electrical Code 2011 Edition
- ASHRAE Standard 62.1 Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 55-2020 Thermal Environmental Conditions for Human Occupancy
- ASHRAE Standard 90.1
- ASHRAE Standard 202-2018 The Commissioning Process

APPENDIX 1- PROJECT DOCUMENTS

Project documents are filed and maintained by WLC on a shared One Drive folder. Contractor shall request a link to same and be notified of any document changes, e.g., updates to the Cx Plan or submittals.

Source	Document
CES Engineering	Mechanical Plans-Permit Set
CES Engineering	Electrical Plans -Permit Set
CES Engineering	Electrical CAD (Folder)
CES Engineering	Structural CAD (Folder)
CES Engineering	Basis of Design Narrative Review- FS 54
CES Engineering	Fire Protection CAD (Folder)
City of Ft Lauderdale	011200 Special conditions WLC modified
City of Ft Lauderdale	012500 SUBSTITUTION PROCEDURES WLC Reviewed
City of Ft Lauderdale	012900 PAYMENT PROCEDURES WLC reviewed
City of Ft Lauderdale	013100 PROJECT MANAGEMENT & COORDINATION modified WLC
City of Ft Lauderdale	013200 CONSTRUCT PROGRESS DOCUMENTATION modified WLC
City of Ft Lauderdale	013233 PHOTOGRAPHIC DOC modified WLC
City of Ft Lauderdale	013300 SUBMITTAL PROCEDURES modified WLC
City of Ft Lauderdale	014000 QUALITY REQUIREMENTS modified WLC
City of Ft Lauderdale	014200 REFERENCES reviewed WLC
City of Ft Lauderdale	015900 CONSTRUCTION PROJECT SIGN REQUEST reviewed WLC
City of Ft Lauderdale	015900 Construction Sign Request Form.Pg. 1 rev WLC
City of Ft Lauderdale	016000 PRODUCT REQUIREMENTS_reviewed WLC
City of Ft Lauderdale	017700 CLOSEOUT PROCEDURES reviewed WLC
City of Ft Lauderdale	017823 OPERATION AND MAINTENANCE DATA modified WLC
City of Ft Lauderdale	017839 PROJECT RECORD DOCS reviewed WLC
City of Ft Lauderdale	017900 DEMONSTRATION AND TRAINING modified WLC
Trane	Submittal AHU1 Trane BOD
Trane	Submittal CU1 Trane BOD
Trane	Submittal DOAS1 Trane BOD
Trane	Submittal Mini Split 2
Trane	Submittal VAV-B
Trane	Submittal VAV-C
Trane	Submittal VAV-D
Trane	Submittal - Mini Split 2 Multi Room
Trane	Submittal RTU2
Trane	Submittal AHU1 Trane p1
Trane	IOM Manuals (folder)
Whiskey Lima Corp.	Cx Plan v1- Fire Station 54 FLL

Table 2- Project Documents

APPENDIX 2- CURRENT FACILITY REQUIREMENTS

Excerpted from original report.

Purpose

These Current Facility Requirements (CFR) are provided by Whiskey Lima Corp., serving as Owner's Representative for the City of Fort Lauderdale, to guide the planning, design, installation, and testing of a retrofit HVAC system for Fire Station 54. This is a working document which will evolve as the project progresses. All contractors for this project should read, understand, and comply with this CFR. Inability to comply with this CFR should be communicated in writing to the Owner's Representative for resolution.

Background

Fire Station 54 is a two story, 10,064 square foot building belonging to the City of Fort Lauderdale (Owner). It was designed to house a permanent fire fighter staff of 2 units consisting of up to 7 personnel operating 24 hours a day, 7 days a week.

Layout

The ground floor includes an apparatus bay, multipurpose/community room, offices, gymnasium, mechanical, electrical and storage spaces The second floor consists of seven firefighter bunk rooms, bath/shower rooms, fully equipped kitchen, dining area and day room.

HVAC Design

The original HVAC system design, dated 2013, used typical indoor design conditions of 72°F and 50% relative humidity (RH), and specified a dedicated outdoor air system (DOAS) in series with one packaged rooftop unit (RTU) and one split AC system. VAV units were to serve the bunk rooms and other spaces. Exhaust included kitchen, bathroom and apparatus bay exhaust systems. Thermostat controls were wall mounted and wireless. The design was altered in 2017 with deletion of the DOAS, replaced with a second RTU without humidity control or reheat capabilities.

HVAC Issues History

The building was placed into service in the fall of 2018 and occupants began operating the HVAC system well below the design temperature (62°F -68°F). In the spring of 2019, high humidity (>70% RH) and indoor condensation were first reported. An HVAC assessment provided in July 2019 concluded that the installed

HVAC system was incapable of providing sufficient dehumidification under the preferred and lower temperature setpoints and should be replaced with a DOAS, as per the original design. It also noted that persistent high humidity would result in microbial/mold growth. The first of two IAQ investigations in December 2019 reported surface microbial and mold growth in seven sampled areas, to include supply air diffusers, interior drywalls and inside the wall system. The consultant (Terracom) recommended temperature and relative humidity adjustments, among other measures. The severity of the issues were addressed in the subsequent two years with multiple measures, to include portable air conditioners, outside air damper closure, freeze stat replacements, Rawal valve installation, and VAV upgrades with reheat strips. Four test and balance projects, and one additional HVAC assessment was performed. The measures failed to resolve the high humidity and microbial growth issues, and the building was evacuated in the fall of 2021.

Project Objective

The current project was initiated to seek permanent problem resolution with a comprehensive redesign and installation of an HVAC system retrofit, expected to be a DOAS. The Owner requires redesign and installation of upgrades necessary to meet the actual (atypical) operating conditions and elimination of the temperature, humidity, and indoor condensation issues. The design team shall thoroughly understand and target the correction of all previous issues described in the Issues Log attached and the historical documents listed in Table 2. Given the past history, failure to do so may result in a non-reversible loss of confidence in the building by its firefighter occupants.

Current Facility Requirements

The Design Team shall provide a Basis of Design to the Owner's Representative for acceptance by the Owner. Guidance is as follows:

Heat Load

The Design Team shall perform a heat load calculation per ASHRAE standards, with emphasis on quantifying the indoor humidity generated by the showers and kitchen use typical for these occupants. The heat load calculation is to be provided to the OR in word, excel, acrobat or other Microsoft office based digital format for review.

Occupancy

The design team shall use revised occupancy as provided by the Owner, as follows:

- First Floor – Maximum occupancy is 30 personnel when community room is in use only.
- Second Floor- Continuous occupancy is 7 firefighters ~~in~~ 2 units/apparatus operating 24/7

Ventilation

Outdoor air intake shall consider the following:

- Revised occupancy as listed above.
- Demand Control ventilation with occupancy/CO2 sensing and modulating outdoor air dampers to limit OA intake to the actual required amount.
- Apparatus Bay ventilation under continuous and purge exhaust modes, to be defined.
- Bunker gear storage room ventilation as code required and to isolate contamination in that space

Indoor Design Operating Conditions

The redesign should be based on the atypical temperature requirements of the occupants, while avoiding excessive relative humidity (>60% continuous) and risk of microbial/mold growth (>60F dew point continuous). It is understood that these new design conditions will not conform with ASHRAE Standard 55-2020 for Acceptable Thermal Environment, as the sensible temperatures required by the firefighters are too low. Desired setpoints have been verified by building officials and are as follows:

- Occupied: 68F db, 50% RH, <60F dew point
- Unoccupied: 72F db, 55% RH, <60F dew point (to be confirmed) . 1st floor unoccupied in evening hours (1800-0600).

Humidity Controls

Indoor humidity and dew point temperature control being of paramount concern, the Design Team shall consider the following HVAC system features:

- Dedicated Outdoor Air System (DOAS) with Reheat capability and Energy Recovery Ventilation (ERV).
- Consider using a DOAS for all outdoor air dehumidification and closing OA dampers on existing RTUs and AHU-1.
- Space Humidity and Dew Point Sensors. Include RH or DPT sensors in appropriate spaces .Trane reported that there are no humidity sensors on the first floor (AHU-1).
- VAV reheat: Design team should seek to integrate the newly installed VAV reheat system.

Building Pressurization

The design team shall provide air balance calculations and documentation for correct pressure relationships between the occupied building (positive), apparatus bay (negative) and contaminated ("hot zone") areas, with consideration of the following:

- Building pressure sensors and alarms
- Interlock between DOAS and exhaust system
- DOAS with ERV and connected exhausts
- Detailed notes and schedules for the use of TAB and HVAC maintenance contractors
- Proper pressurization between "hot" and other zones in the apparatus bay, bunker room and other spaces

Air Distribution

The design team shall add required ductwork and equipment and correct known deficiencies, as follows:

- Provide DOAS air flow directly to selected spaces or to RTU-2 and AHU-1.
- Avoid rooftop duct work if possible.
- Repair/replace the RTU1 and 2 return air ducts, reported to be undersized.
- Repair ZD-1 VAV air flows to corridor 1 (bunk rooms), reported by Richard Flanders TAB (8/24/21) as only sized to provide 49% of design air flows.
- Repair/replace VAV-1 controller, reported to be inoperable in ICTB test and balance report dated October 10, 2021.
- Repair static pressure fault for AHU-1, reported by ICTB TAB report (10/1/21) to be at 2.28" wc versus a design static pressure of 1" wc
- Assess the lack of return air grill(s) in second floor kitchen/dining area to prevent humidity migration into the bunk room area.
- Add missing access doors and balancing dampers for first floor electric room and bathrooms 4 and 5. Reported by Richard Flanders TAB report dated August 24, 2021.

Exhaust

- Apparatus Bay- exhaust should activate on motion sensors (occupancy) to ventilate the space before vehicles are started through the departure of firefighters from the bay. Ventilate based on eliminating diesel particulate in the bay area, if possible, instead of existing carbon monoxide (CO) detection.
- Kitchen Exhaust and Make Up Air (MAU)- Review calculations and air balance and modify from existing design as required, in combination with review of the return air that is lacking in the adjacent dining room area. Verify backdraft damper repair on the existing MUA unit.
- Bathroom Exhaust- Consider increasing the flow rate of shower exhaust in the bunk room area. Existing flow rates of 50 cfm may be insufficient to remove humidity from this space.
- Control and DOAS/ERV Integration- Determine whether constant, intermittent, occupancy controlled, or DOAS/ERV options are best to control OA intake and exhaust to preserve positive building pressurization.

Controls

- Apparatus Bay- disconnect the app bay system from Trane BMS
- Bunk Rooms- limit minimum cooling temperature setpoint to 68°F to prevent indoor condensation

Other Indoor Environmental Quality

- COVID Measures- In addition to improvement in temperature and humidity control, the design team should comply with recent guidelines to reduce the risk of airborne transmission of pathogens, to include COVID.
- Air Cleaning- To reduce any residual air contamination and produce higher equivalent air changes per hour (eACH), add Ultraviolet Germicidal Irradiation (UVGI) units to supply air ductwork.

Special Functional Areas

- Bunk Rooms- It is understood that bunk room thermostats have been disabled to only provide monitoring of temperature and RH. Restore control of the VAVs with recently installed reheat strips. Per Owner review and acceptance, limit thermostat setting to a minimum cooling temperature of 68F and 50% relative humidity.
- Medical Storage- Subject to frequent door opening. needs to be isolated from app bay and other humidity source.
- Fire Poles- design to prevent upward flow of contamination from app bay into the living quarters/offices
- Kitchen - Review and adjust kitchen exhaust and makeup air design and operational settings. Verify that the unit has a fully operational backdraft damper, which was reported missing after original installation. Assess and correct the lack of return air from the kitchen area, with emphasis on preventing humidity migration from the kitchen area into the bunk room area.
- Showers - Bath and shower exhaust rates are 50 cfm, which may be inadequate for humidity control in the adjacent corridor and bunk room areas. Assess and adjust as required.

Schedule

The design team shall consider existing/new occupancy and other sensor capabilities that might allow optimal control of HVAC operation. Humidity and dew point control must be preserved at any higher unoccupied sensible temperatures. The Owner requires the following:

- First Floor- occupied between 0600-2100 daily; timed operator override of unoccupied setpoint
- Second Floor- continuously occupied at setpoint 68°F

Test and Balance

TAB data will be critical to verifying that installation and equipment operation conforms to this CFR. The design team shall specify in notes and detail drawings that the TAB contractor will perform the following testing in addition to their NEBB standard testing:

- DOAS measurements
  - Outdoor Air Intake Temperature (F)
  - Outdoor Air Intake flow rate (cfm)
  - Supply Air Temperature (F)
  - Supply Air flow (cfm)
  - Space or Return Air Relative Humidity (%RH)
  - Space or Return Air Dew Point Temperature (F)
  - Static Pressure (in wc)
- RTU 1 and 2 measurements
  - Outdoor Air Intake Temperature (F)
  - Outdoor Air Intake flow rate (cfm)
- Supply Air Diffusers
  - Supply Air Temperature (F)
  - Dew Point Temperature (F)

Limited Retrocommissioning

The Owner's Representative has been contracted to perform a limited scope RCx to verify that critical planning, design, and installation tasks comply with this CFR. Contracted tasks and deliverables include the following:

Development of Current Facility Requirements (CFR)

This CFR was developed by the OR based on knowledge of Fire Station 54 history, review of Owner-provided reports, plans and other documents, and review and acceptance of the drafted CFR by the Owner.

Provide a Commissioning Plan

The OR will develop an RCx Plan to be used by the installation contractors (mechanical, test and balance, etc.) to guide and document their installation and testing.

Perform Design Review

Pursuant to this CFR, the design team shall provide a Basis of Design (BoD) document which explains in narrative form how the CFR will be achieved with design, equipment selection, controls, etc. This BoD will be reviewed and accepted by the Owner before commencement of the design phase. The OR will then review the overall design for compliance with the CFR. An Issues and Resolutions Log will be provided to address and document discrepancies and actions taken.

Construction Monitoring and Testing

The OR will inspect and monitor installation and review all Cx Plan testing by contractors. An Issues and Resolutions Log will be provided to address and document discrepancies and actions taken.

APPENDIX 3- BASIS OF DESIGN

See Project Document " Basis of Design Narrative Review – FS 54"

APPENDIX 4- COMMISSIONING SPECIFICATIONS

See Project Documents for City Specifications modified by WLC to include Cx Specifications

APPENDIX 5- SYSTEMS TO BE COMMISSIONED

See Mechanical Plans Equipment Schedule details of the following equipment to be commissioned:

1 each DOAS

1 each RTU2

1 each Split 1 (AHU1 and CU1)

1 each Mini Split 2 (AHU2 and CU2)

6 each VAVB/C/D

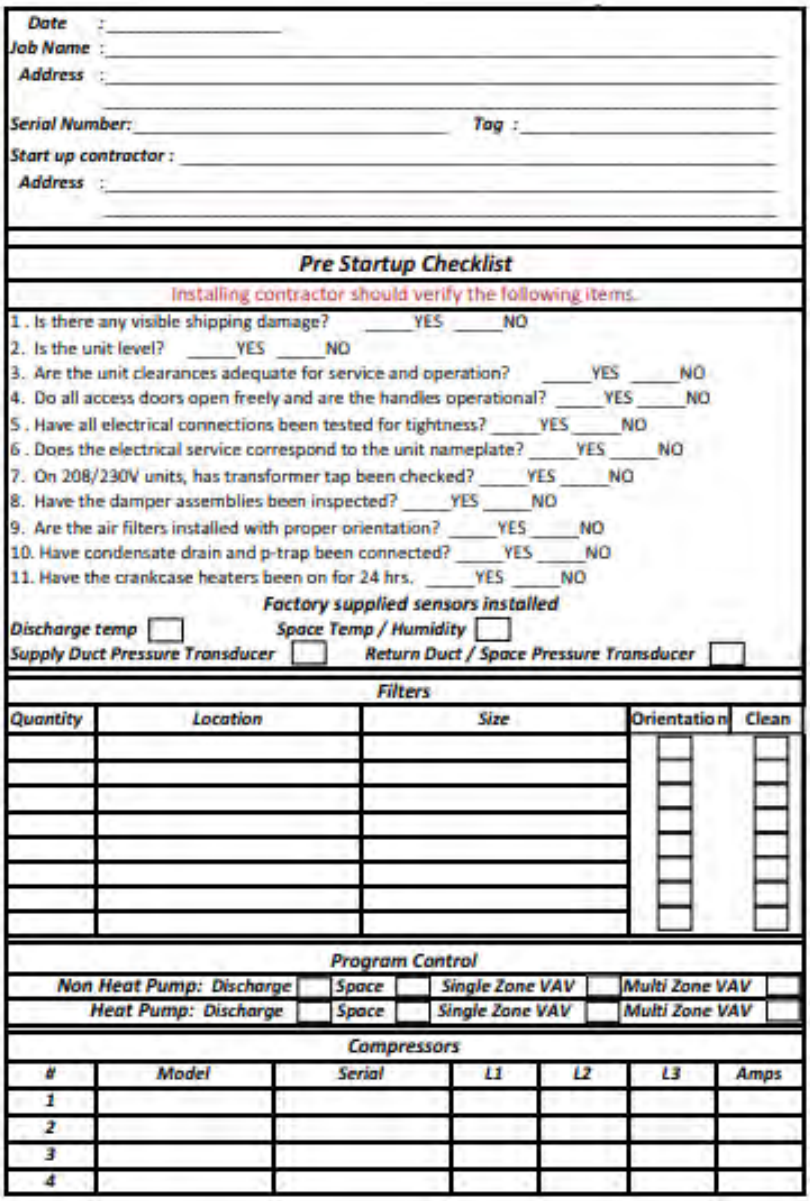
Controls and Sequences of Operations per Mechanical Plans

APPENDIX 6- START UP CHECKLISTS

Contractor shall complete and submit to the CxP the manufacturer's startup checklists for all commissionable HVAC equipment and controls, as provided in the IOM manuals.

DOAS1

DOAS 1 has Start Up checklists starting on pages 65-67 of its IOM manual, publication number OAU-SVX006C-EN dated November 2019. Excerpts are shown below:



Date :_____
Job Name :_____
Address :_____
_____
Serial Number:_____ Tag :_____
Start up contractor : _____
Address :_____
_____

Pre Startup Checklist

Installing contractor should verify the following items.

1. Is there any visible shipping damage? _____YES _____NO
2. Is the unit level? _____YES _____NO
3. Are the unit clearances adequate for service and operation? _____YES _____NO
4. Do all access doors open freely and are the handles operational? _____YES _____NO
5. Have all electrical connections been tested for tightness? _____YES _____NO
6. Does the electrical service correspond to the unit nameplate? _____YES _____NO
7. On 208/230V units, has transformer tap been checked? _____YES _____NO
8. Have the damper assemblies been inspected? _____YES _____NO
9. Are the air filters installed with proper orientation? _____YES _____NO
10. Have condensate drain and p-trap been connected? _____YES _____NO
11. Have the crankcase heaters been on for 24 hrs. _____YES _____NO

Factory supplied sensors installed

Discharge temp ☐ Space Temp / Humidity ☐
Supply Duct Pressure Transducer ☐ Return Duct / Space Pressure Transducer ☐

Filters

Quantity	Location	Size	Orientation	Clean
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐

Program Control

Non Heat Pump: Discharge	☐	Space	☐	Single Zone VAV	☐	Multi Zone VAV	☐
Heat Pump: Discharge	☐	Space	☐	Single Zone VAV	☐	Multi Zone VAV	☐

Compressors

#	Model	Serial	L1	L2	L3	Amps
1						
2						
3						
4						

Figure 1-Start Up Checklist for DOAS-1 (1)

Supply Fan Assembly										
Fan 2 - Alignment		Name plate amps:		Actual Amps:		Rotation		Hrtz:		
Fan 2 - Alignment		Name plate amps:		Actual Amps:		Rotation		Hrtz:		
Energy Recover Wheel										
Wheel Spins freely		Check Rotation		FLA:						
Voltage	L1:	L2:	L3:		Amps:		HP:			
Power Exhaust Fan Assembly										
Fan 2 - Alignment		Name plate amps:		Actual Amps:		Rotation		Hrtz:		
Fan 2 - Alignment		Name plate amps:		Actual Amps:		Rotation		Hrtz:		

Dampers					
Damper set up	Modulating		Two Position		Operation check

Ambient Temperature	
Ambient Dry Bulb Temperature_____°F	Ambient Wet Bulb Temperature_____°F

Condenser Configuration						
Water Cooled						
No water leaks		Water Flow :_____ GPM				
Water Inlet Temp :_____°F		Water Outlet Temp:_____°F				
Air Cooled		L1	L2	L3	Amps	HP
	Fan 1					
	Fan 2					
	Fan 3					
	Fan 4					

Refrigeration System --Circuit 1					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

Refrigeration System --Circuit 2					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

HEATING -- Refrigeration System (Heat Pump Only) --Circuit 1					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

HEATING -- Refrigeration System (Heat Pump Only) --Circuit 2					
	Pressure	Sat Temperature	Line Temperature	Subcooling	Super Heat
Discharge					
Suction					
Liquid					

Figure 2-Start Up Checklist for DOAS-1 (2)

Electric Heat				
Pre Heat:	Amps	L1:	L2:	L3:
Primary:	Amps	L1:	L2:	L3:

Figure 3-Start Up Checklist for DOAS-1 (3)

RTU2

RTU2 has Pre-Start, Unit Start Up and Sequence of Operations checks on pages 46-65 of IOM publication OAU-SVX006C-EN dated April 2020. WLC will provide a more abbreviated checklists corresponding to the final unit configuration.

Split System 1 (AHU1 & CU1)

AHU1 has per-start, general, fan, coil and electrical checks that begin on page 65 of IOM publication BCX-SVX001A-EN dated October 2013. CU1 has start up and checkout procedures in the installer guide is publication 18-AC51D1-9-EN. Excerpt of Checkout procedure is shown below:

Final phases of this installation are the unit Operational and Checkout Procedures. To obtain proper performance, all units must be operated and charge adjustments made.

Important: *Perform a final unit inspection to be sure that factory tubing has not shifted during shipment. Adjust tubing if necessary so tubes do not rub against each other when the unit runs. Also be sure that wiring connections are tight and properly secured.*

CHECKOUT PROCEDURE

After installation has been completed, it is recommended that the entire system be checked against the following list:

1. Leak check refrigerant lines. ..... [ ]
2. Properly insulate suction lines and fittings..... [ ]
3. Properly secure and isolate all refrigerant lines..... [ ]
4. Seal passages through masonry. If mortar is used, prevent mortar from coming into direct contact with copper tubing. ..... [ ]
5. Verify that all electrical connections are tight..... [ ]
6. Observe outdoor fan during on cycle for clearance and smooth operation..... [ ]
7. Be sure that indoor coil drain line drains freely. Pour water into drain pan..... [ ]
8. Be sure that supply registers and return grilles are open and unobstructed..... [ ]
9. Be sure that a return air filter is installed..... [ ]
10. Be sure that the correct airflow setting is used. (Indoor blower motor) ..... [ ]
11. Operate complete system in each mode to ensure safe operation..... [ ]

Figure 4- Checkout Procedures for CU1

Mini Split System (AHU2 & CU2)

IOM for TPLA is unavailable for now. WLC will provide an update or custom checklists.

VAV Systems

VAV models VCEF have installation and unit setup checks beginning on page 32 of publication VAV-SVN01E-EN date June 2006.

APPENDIX 7- FUNCTIONAL PERFORMANCE TESTS

Functional Performance Tests (FPT) will be performed on commissionable HVAC equipment and controls after start up checks are verified. FPTs will test all sequences of operations listed on the mechanical plans and verify proper systems setpoints, safeties, interlocks and integration. WLC will create the required checklists after equipment is ordered and RFIs are satisfied. Contractors will provide personnel to operate the equipment and WLC will witness and verify that operation. Issues identified during testing will be recorded by WLC in the Issues and Resolutions Log, to be corrected by the appropriate contractor.

APPENDIX 8- ISSUES AND RESOLUTIONS LOG

The Issues and Resolutions Log template is shown below with project samples. Contractor shall resolve all Issues identified and recorded during Cx and FPTs.

Statu	Reference	Issue Type	Issue Description	Proposed Resolution	Assigned
Complete	1900000000	HVAC	Mech reported that RTU-1 freeze stat was reported faulty	Verify repair or adjustment	Mech/Trane
Complete	1900000000	HVAC	Mech reported that RTU1 was going into heat mode due to low temperature setpoints; reported as corrected	Verify correction	Trane/Mech
Complete	2109280000R	Humidity	Terracon reported RH>60% in both September and December reports	Confirm with data loggers deployed	WLC
Complete	2112031004E	Humidity	City reported RH>70% in bunk rooms with temperatures between 62-67F db after OAD closed. Exhaust status is unknown, therefore building pressurization status is unknown	Confirm the status	City
Complete	2112131530I	Controls	Multiple tstats (3) observed in corridors; unknown which control units and which are for monitoring	Verify stat status following retrofit; completed	Trane
Complete	B&I	Drawings	Please send the original building drawings so we have the roof pitch and drop ceiling info.	Whiskey Lima to add original building drawings to One Drive shared Project Documents	WLC

Table 3-Sample Issues and Resolutions Log

APPENDIX 9- SYSTEMS MANUAL

WLC shall assemble a digital Systems Manual to guide building staff and occupants in the operation and maintenance of the HVAC equipment and controls. Contractor shall provide new documents and updates to existing project documents as requested by WLC.

APPENDIX 10- SYSTEMS TRAINING

WLC shall develop and perform 8 hours of HVAC systems operation and maintenance training for building maintenance staff, after development of the Systems Manual. Contractor shall provide one certified technician to assist in the training.

APPENDIX 11- WARRANTY AND SEASONAL REVIEW

WLC will propose seasonal and warranty review and testing of equipment, as dictated by conditions of the original commissioning for this project. Priority will be to test during peak cooling load conditions that are expected to be from July- September.

QUESTIONNAIRE SHEET

PLEASE PRINT OR TYPE:

Firm Name:

President

Business Address:

Telephone: Fax:

E-Mail Address:

What was the last project of this nature which you completed? Include the year, description, and contract value.

The following are named as three corporations and representatives of those corporations for which you have performed work similar to that required by this contract, and which the City may contact as your references (include addresses, telephone numbers and e-mail addresses). Include the project name, year, description, and contract value.

How many years has your organization been in business?

Have you ever failed to complete work awarded to you; if so, where and why?

The name of the qualifying agent for the firm and his position is:

Certificate of Competency Number of Qualifying Agent:

Effective Date: Expiration Date:

Licensed in: Engineering Contractor's License #

(County/State)

Expiration Date:

NOTE: To be considered for award of this contract, the bidder must submit a financial statement upon request.

NOTE: Contractor must have proper licensing and shall provide copy of same with his proposal.

QUESTIONNAIRE SHEET

1. Have you personally inspected the proposed work and have you a complete plan for its performance?

2. Will you sublet any part of this work? If so, list the portions or specialties of the work that you will.

a)

b)

c)

d)

e)

f)

g)

3. What equipment do you own that is available for the work?

4. What equipment will you purchase for the proposed work?

5. What equipment will you rent for the proposed work?

LOCAL BUSINESS PREFERENCE CERTIFICATION STATEMENT

Section 2-186, Code of Ordinances of the City of Fort Lauderdale, (Ordinance No. C-17-26), provides for a local business preference.

In order to be considered for a local business preference, a bidder must include the Local Business Preference Certification Statement of this bid/proposal, as applicable to the local business preference class claimed **at the time of bid submittal.**

Upon formal request of the City, based on the application of a Local Business Preference, the Bidder shall, within ten (10) calendar days, submit the following documentation for the Local Business Preference Class claimed:

a) Copy of City of Fort Lauderdale current year business tax receipt, **or** Broward County current year business tax receipt, **and**

b) List of the names of all employees of the bidder and evidence of employees' residences within the geographic bounds of the City of Fort Lauderdale or Broward County, as the case may be, such as current Florida driver license, residential utility bill (water, electric, telephone, cable television), or other type of similar documentation acceptable to the City.

Failure to comply at time of bid submittal shall result in the bidder being found ineligible for the local business preference.

THE COMPLETE LOCAL BUSINESS PREFERENCE ORDINANCE MAY BE FOUND ON THE CITY'S WEB SITE AT THE FOLLOWING LINK: h ps://library.municode.com/fl/fort_lauderdale/codes/code_of_ordinances?nodeId=COOR_CH2AD_ARTVFI_DIV2PR_S2-186LOBUPR&showChanges=true

Definitions: The term "Business" shall mean a person, firm, corporation or other business entity which is duly licensed and authorized to engage in a particular work in the State of Florida. Business shall be broken down into four (4) types of classes:

1. Class A Business – shall mean any business that has established and agrees to maintain a permanent place of business located in a non-residential zone and staffed with full-time employees within the limits of the City, **and** shall maintain a staffing level for the proposed work of at least fifty percent (50%) who are residents of the City of Fort Lauderdale.
2. Class B Business - shall mean any business that has established and agrees to maintain a permanent place of business located in a non-residential zone, staffed with full-time employees within the limits of the City, **or** shall maintain a staffing level for the proposed work of at least fifty percent (50%) who are residents of the City of Fort Lauderdale.
3. Class C Business - shall mean any business that has established and agrees to maintain a permanent place of business located in a non-residential zone, staffed with full-time employees within the limits of Broward County.
4. Class D Business – shall mean any Business that does not qualify as either a Class A, Class B, or Class C business.

LOCAL BUSINESS PREFERENCE CERTIFICATION STATEMENT

The Business identified below certifies that it qualifies for the local business preference classification as indicated herein, and further certifies and agrees that it will re-affirm its local preference classification annually no later than thirty (30) calendar days prior to the anniversary of the date of a contract awarded pursuant to this bid/proposal. Violation of the foregoing provision may result in contract termination.

(1) _____ (Business Name) is a **Class A** Business as defined in City of Fort Lauderdale Ordinance No. C-17-26, Sec. 2-186. A copy of the City of Fort Lauderdale current year Business Tax Receipt **and** a complete list of full-time employees and evidence of their addresses shall be provided within ten (10) calendar days of a formal request by the City.

(2) _____ (Business Name) is a **Class B** Business as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec. 2-186. A copy of the Business Tax Receipt **or** a complete list of full-time employees and evidence of their addresses shall be provided within ten (10) calendar days of a formal request by the City.

(3) _____ (Business Name) is a **Class C** Business as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec. 2-186. A copy of the Broward County Business Tax Receipt shall be provided within ten (10) calendar days of a formal request by the City.

(4) _____ (Business Name) is a **Class D** Business as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec. 2-186, and does not qualify for Local Preference consideration.

(5) _____ (Business Name) requests a **Conditional Class A** classification as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec.2-186. Written certification of intent to meet the requirements shall be provided to the City within three (3) months of entering into a contract with the City.

(6) _____ (Business Name) requests a **Conditional Class B** classification as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec.2-186. Written certification of intent to meet the requirements shall be provided to the City within three (3) months of entering into a contract with the City.

BIDDER'S COMPANY: _____

AUTHORIZED COMPANY PERSON: _____ _____ _____

PRINT NAME SIGNATURE DATE

Forms Non-ISO – Revised 7/2/2021

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PREFERENCE

Section 2-185, Code of Ordinances of the City of Fort Lauderdale, provides for a disadvantaged business enterprise preference.

In order to be considered for a DBE Preference, a bidder must include a certification from a government agency, as applicable to the DBE Preference class claimed **at the time of bid submittal**.

Upon formal request of the City, based on the application of a DBE Preference the Bidder shall, within **ten (10)** calendar days, submit the following documentation to the DBE Class claimed:

a) Copy of City of Fort Lauderdale current year business tax receipt, **or** Broward County current year business tax receipt, **or** State of Florida active registration **and/or**

b) List of the names of all employees of the bidder and evidence of employees' residences within the geographic bounds of the City of Fort Lauderdale or Broward County, as the case may be, such as current Florida driver license, residential utility bill (water, electric, telephone, cable television), or other type of similar documentation acceptable to the City.

Failure to comply at time of bid submittal shall result in the bidder being found ineligible for the disadvantaged business enterprise preference.

THE COMPLETE DBE PREFERENCE ORDINANCE MAY BE FOUND ON THE CITY'S WEB SITE AT THE FOLLOWING LINK: h ps://library.municode.com/fl/fort_lauderdale/codes/code_of_ordinances?nodeId=COOR_CH2AD_ARTVFI_DIV2PR_S2-185EQOPDIBUEN&showChanges=true

Definitions

a. The term "disadvantaged class 1 enterprise" shall mean any disadvantaged business enterprise that has established and agrees to maintain a permanent place of business located in a non-residential zone, staffed with full-time employees within the limits of the City, and provides supporting documentation of its City of Fort Lauderdale business tax and disadvantaged certification as established in the City's Procurement Manual.

b. The term "disadvantaged class 2 enterprise" shall mean any disadvantaged business enterprise that has established and agrees to maintain a permanent place of business within the limits of the City with full-time employees and provides supporting documentation of its City of Fort Lauderdale business tax and disadvantaged certification as established in the City's Procurement Manual.

c. The term "disadvantaged class 3 enterprise" shall mean any disadvantaged business enterprise that has established and agrees to maintain a permanent place of business located in a non-residential zone, staffed with full-time employees within the limits of the Tri-County area and provides supporting documentation of its City of Fort Lauderdale business tax and disadvantaged certification as established in the City's Procurement Manual.

d. The term "disadvantaged class 4 enterprise" shall mean any disadvantaged business enterprise that does not qualify as a Class 1, Class 2, or Class 3 business, but is located in the State of Florida and provides supporting documentation of its disadvantaged certification as established in the City's Procurement Manual.

DISADVANTAGED BUSINESS ENTERPRISE CERTIFICATION STATEMENT

The Business identified below certifies that it qualifies for the disadvantaged business enterprise preference classification as indicated herein, and further certifies and agrees that it will re-affirm its preference classification annually no later than **thirty (30)** calendar days prior to the anniversary of the date of a contract awarded pursuant to this solicitation. Violation of the foregoing provision may result in contract termination.

(1) _____ (Business Name) is a disadvantaged **Class 1** enterprise as defined in the City of Fort Lauderdale Ordinance Section 2-185 disadvantaged business enterprise that has established and agrees to maintain a permanent place of business located in a non-residential zone, staffed with full-time employees within the limits of the City, and provides supporting documentation of its City of Fort Lauderdale business tax and disadvantaged certification as established in the City's Procurement Manual.

(2) _____ (Business Name) is a disadvantaged **Class 2** enterprise as defined in the City of Fort Lauderdale Ordinance Section 2-185 disadvantaged business enterprise that has established and agrees to maintain a permanent place of business within the limits of the City with full-time employee(s) and provides supporting documentation of its City of Fort Lauderdale business tax and disadvantaged certification as established in the City's Procurement Manual.

(3) _____ (Business Name) is a disadvantaged **Class 3** enterprise as defined in the City of Fort Lauderdale Ordinance Section 2-185 disadvantaged business enterprise that has established and agrees to maintain a permanent place of business located in a non-residential zone, staffed with full-time employees within the limits of the Tri-County area and provides supporting documentation of its City of Fort Lauderdale business tax and disadvantaged certification as established in the City's Procurement Manual.

(4) _____ (Business Name) is a disadvantaged **Class 4** enterprise as defined in the City of Fort Lauderdale Ordinance Section 2-185 disadvantaged business enterprise that does not qualify as a Class 1, Class 2, or Class 3 business, but is located in the State of Florida and provides supporting documentation of its disadvantaged certification as established in the City's Procurement Manual.

(5) _____ (Business Name) requests a **Conditional Class 1** classification as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec.2-186. Written certification of intent to meet the requirements shall be provided to the City within three (3) months of entering into a contract with the City.

(6) _____ (Business Name) requests a **Conditional Class 2** classification as defined in the City of Fort Lauderdale Ordinance No. C-17-26, Sec.2-186. Written certification of intent to meet the requirements shall be provided to the City within three (3) months of entering into a contract with the City.

BIDDER'S COMPANY: _____

AUTHORIZED COMPANY PERSON: _____ PRINT NAME _____ SIGNATURE _____ DATE

Forms Non-Iso – revised 7/2/2021

NON-COLLUSION STATEMENT:

By signing this offer, the vendor/contractor certifies that this offer is made independently and *free* from collusion. Vendor shall disclose below any City of Fort Lauderdale, FL officer or employee, or any relative of any such officer or employee who is an officer or director of, or has a material interest in, the vendor's business, who is in a position to influence this procurement.

Any City of Fort Lauderdale, FL officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement.

For purposes hereof, a person has a material interest if they directly or indirectly own more than 5 percent of the total assets or capital stock of any business entity, or if they otherwise stand to personally gain if the contract is awarded to this vendor.

In accordance with City of Fort Lauderdale, FL Policy and Standards Manual, 6.10.8.3,

> 3.3. City employees may not contract with the City through any corporation or business entity in which they or their immediate family members hold a controlling financial interest (e.g. ownership of five (5) percent or more).
>
> 3.4. Immediate family members (spouse, parents and children) are also prohibited from contracting with the City subject to the same general rules.

Failure of a vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the City Procurement Code.

NAME	RELATIONSHIPS

In the event the vendor does not indicate any names, the City shall interpret this to mean that the vendor has indicated that no such relationships exist.

Authorized Signature	Title
Name (Printed)	Date

CONTRACT PAYMENT METHOD

The City of Fort Lauderdale has implemented a Procurement Card (P-Card) program which changes how payments are remitted to its vendors. The City has transitioned from traditional paper checks to credit card payments via MasterCard or Visa as part of this program.

This allows you as a vendor of the City of Fort Lauderdale to receive your payments fast and safely. No more waiting for checks to be printed and mailed.

In accordance with the contract, payments on this contract will be made utilizing the City's P-Card (MasterCard or Visa). Accordingly, bidders must presently have the ability to accept these credit cards or take whatever steps necessary to implement acceptance of a card before the start of the contract term, or contract award by the City.

All costs associated with the Contractor's participation in this purchasing program shall be borne by the Contractor. The City reserves the right to revise this program as necessary.

By signing below you agree with these terms.

Please indicate which credit card payment you prefer:

- ☐ MasterCard
- ☐ Visa

Company Name

Name (Printed)

Signature

Date

Title

CONTRACTOR'S CERTIFICATE OF COMPLIANCE WITH NON-DISCRIMINATION PROVISIONS OF THE CONTRACT

The completed and signed form should be returned with the Contractor's submittal. If not provided with submittal, the Contractor must submit within three business days of City's request. Contractor may be deemed non-responsive for failure to fully comply within stated timeframes.

Pursuant to City Ordinance Sec. 2-187(c), bidders must certify compliance with the Non-Discrimination provision of the ordinance.

The Contractor shall not, in any of his/her/its activities, including employment, discriminate against any individual on the basis of race, color, national origin, religion, creed, sex, disability, sexual orientation, gender, gender identity, gender expression, or marital status.

1. The Contractor certifies and represents that he/she/it will comply with Section 2-187, Code of Ordinances of the City of Fort Lauderdale, Florida, as amended by Ordinance C-18-33 (collectively, "Section 2-187").

2. The failure of the Contractor to comply with Section 2-187 shall be deemed to be a material breach of this Agreement, entitling the City to pursue any remedy stated below or any remedy provided under applicable law.

3. The City may terminate this Agreement if the Contractor fails to comply with Section 2-187.

4. The City may retain all monies due or to become due until the Contractor complies with Section 2-187.

5. The Contractor may be subject to debarment or suspension proceedings. Such proceedings will be consistent with the procedures in section 2-183 of the Code of Ordinances of the City of Fort Lauderdale, Florida.

Authorized Signature

Print Name and Title

Date

CONSTRUCTION BID CERTIFICATION

Please Note: It is the sole responsibility of the bidder to ensure that his bid is submitted electronically through www.BidSync.com prior to the bid opening date and time listed. Paper bid submittals will not be accepted. All fields below must be completed. If the field does not apply to you, please note N/A in that field.

If you are a foreign corporation, you may be required to obtain a certificate of authority from the Department of State, in accordance with Florida Statute §607.1501 (visit http://www.dos.state.fl.us/).

Company: (Legal Registration)

Address:

City: State: Zip:

Telephone No.: FAX No.: Email:

Check box if your firm qualifies for MBE / SBE / WBE:

If a corporation, state the name of the President, Secretary and Resident Agent. If a partnership, state the names of all partners. If a trade name, state the names of the individuals who do business under the trade name.

Name	**Title**	**Name**	**Title**
Name	**Title**	**Name**	**Title**

ADDENDUM ACKNOWLEDGEMENT - Bidder acknowledges that the following addenda have been received and are included in the proposal:

Addendum No.	Date Issued	Addendum No.	Date Issued	Addendum No.	Date Issued

VARIANCES: If you take exception or have variances to any term, condition, specification, or requirement in this bid you must specify such variance in the space provided below or reference in the space provided below all variances contained on other pages within your bid. Additional pages may be attached if necessary. No variances will be deemed to be part of the bid submitted unless such is listed and contained in the space provided below. The City does not, by virtue of submitting a variance, necessarily accept any variances. If no statement is contained in the below space, it is hereby implied that your response is in full compliance with this competitive solicitation. If you do not have variances, simply mark N/A. **You must also click the "Take Exception" button.**

The below signatory affirms that he has or will obtain all required permits and licenses from the appropriate agencies, and that his firm is authorized to do business in the State of Florida. The below signatory agrees to furnish all labor, tools, material, equipment and supplies, and to sustain all the expense incurred in doing the work set forth in strict accordance with the bid plans and contract documents at the unit prices indicated if awarded a contract. The below signatory has not divulged to, discussed, or compared this bid with other bidders, and has not colluded with any other bidder or parties to this bid whatsoever. Furthermore, the undersigned guarantees the truth and accuracy of all statements and answers contained in this bid. The below signatory also hereby agrees, by virtue of submitting or attempting to submit a bid, that in no event shall the City's liability for bidder's direct, indirect, incidental, consequential, special or exemplary damages, expenses, or lost profits arising out of this competitive solicitation process, including but not limited to public advertisement, bid conferences, site visits, evaluations, oral presentations, or award proceedings exceed the amount of Five Hundred Dollars ($500.00). This limitation shall not apply to claims arising under any provision of indemnification or the City's protest ordinance contained in this competitive solicitation.

Submitted by:

Name (printed) Signature

Date Title

Revised 4/28/2020

E-VERIFY AFFIRMATION STATEMENT

RFP/Bid /Contract No:

Project Description:

Contractor/Proposer/Bidder acknowledges and agrees to utilize the U.S. Department of Homeland Security's E-Verify System to verify the employment eligibility of,

(a) all persons employed by Contractor/Proposer/Bidder to perform employment duties within Florida during the term of the Contract, and,

(b) all persons (including subcontractors/vendors) assigned by Contractor/Proposer/Bidder to perform work pursuant to the Contract.

The Contractor/Proposer/Bidder acknowledges and agrees that use of the U.S. Department of Homeland Security's E-Verify System during the term of the Contract is a condition of the Contract.

Contractor/Proposer/ Bidder Company Name:

Authorized Company Person's Signature:

Authorized Company Person's Title:

Date:

9/15/2020

BID NO. 12660-1023 SPECIFIC REFERENCES FORM

The Bidder shall have previous construction experience in constructing new seawalls, in the State of Florida within the last ten (10).

Bidder shall submit proof of construction experience for a minimum of three (3) projects of similar scope and scale (or larger) and shall, for each project listed, identify location; dates of construction; project name and overall scope; scope of work that was self-performed by Contractor; and client's name, address, telephone number and e-mail address.

Note: Do not include proposed team members or parent/subsidiary/affiliated companies as references in your submittals.

A. PRIME BIDDER'S NAME: _____

CLIENT NO.1 - Name of firm to be contacted: _____

Address: _____

Contact Person: _____

Phone No: (___) _____

Contact E-Mail Address: _____

Project Performance Period: _____ to _____
Dates should be in mm/yy format

Project Name : _____

Location of Project: _____

Description of the overall scope: _____

_____

_____

_____

Description of work that was self-performed by Bidder:

_____

_____

_____

_____

_____

_____

_____

BID NO. 12660-1023 SPECIFIC REFERENCES FORM

CLIENT NO.2 - Name of firm to be contacted: _____

Address: _____

Contact Person: _____

Phone No: (___) _____

Contact E-Mail Address: _____

Project Performance Period: _____ to _____
Dates should be in mm/yy format

Project Name : _____

Location of Project: _____

Description of the overall scope: _____

_____

_____

_____

Description of work that was self-performed by Bidder:

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BID NO. 12660-1023 SPECIFIC REFERENCES FORM

CLIENT NO.3 - Name of firm to be contacted: _____

Address: _____

Contact Person: _____

Phone No: (___) _____

Contact E-Mail Address: _____

Project Performance Period: _____ to _____
Dates should be in mm/yy format

Project Name : _____

Location of Project: _____

Description of the overall scope: _____

_____

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Description of work that was self-performed by Bidder:

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Question and Answers for Bid #12660-1023 - Fire Station 54 HVAC Retrofit

Overall Bid Questions

There are no questions associated with this bid.